Miami-Dade Water and Sewer Department

Overflow Prevention Program

June 2006

Miami-Dade Water and Sewer Department
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Section 1.0   Introduction

This report titled "Overflow Prevention Program (OPP)" is one of four (4) reports presented in the Phase I Sanitary Sewer Overflow (SSO) Abatement Demonstration Project. It seeks to share an approach found to be successful for reducing Sanitary Sewer Overflows (SSOs) in emergency situations. The OPP Program was implemented and continues to be managed and maintained by the Miami-Dade Water and Sewer Department's (MDWASD's) Pump Station Maintenance Division.

1.1 Background

South Florida is a growing region which has seen continuous development over the past 25 years. To accommodate this growth, the Miami-Dade wastewater system has expanded tremendously either through new construction or upgrades to the existing infrastructure. This growth continues to present daily challenges in the operation of the wastewater transmission system. The flat topography of Miami-Dade County requires the use of pump stations to move wastewater from local neighborhoods to the treatment facilities. In 1980 there were approximately 600 sewage pump stations. By 1994, MDWASD was operating and maintaining over 800 pump stations. As a direct result of regulatory agency enforcement actions, described in one of the other three reports titled "EPA SSO Report", management realized that to effectively operate a system of this size required dedicated resources. Based upon this need, the Pump Station Maintenance Division (PSMD) was formed. The Pump Station Maintenance Division is tasked with operation and maintenance responsibilities. The primary mission is to provide uninterrupted service of wastewater collection and pumping facilities (regional, boosters, and re-pumps) in order to protect the health and safety of the 2.3 million residents of Dade-County.   The Division employees are also vital in providing improvement, and upgrade recommendations for effective and continuous operation of all MDWASD wastewater pump stations. Today, the Miami-Dade Water & Sewer Department (MDWSAD) operates and maintains approximately 992 pump stations, and is expecting to reach the 1000 mark by the end of 2006.

Due to its geographical location South Florida is prone to inclement weather throughout the year, such as seasonal tropical depressions and storms, hurricanes, and frequent thunderstorm activity. Each event poses different threats to the effective operation of the wastewater system due to rain dependent inflow and infiltration (RDII), wind or lightning strikes. These events coupled with the fact that most of South Florida's topography exists within several feet of the water table, contributed to excessive Sanitary Sewer Overflows (SSOs) which led to the aforementioned regulatory enforcement actions. After several years of implementing design and construction of sanitary sewage collection system and treatment plant improvements required by the regulatory agency agreements, it became apparent that it was impractical to design the sewage collection system for emergency situations given South Florida's topography and potential for inclement weather. One of the Consent Decrees requires MDWASD's sewage collection and transmission system be designed eventually based upon a peak flow criteria and a minimum Two-Year Storm Event as defined by South Florida Water Management District (SFWMD) Standards. In consideration of present USEPA Clean Water Act rules, and those being promulgated concerning SSOs, it was anticipated that the system would be designed for the required Two-Year Storm, and that it would be managed to prevent or reduce SSOs in emergency situations.

To meet the County's mission of **"Delivering *Excellence Every Day"***, MDWASD with its PSMD, recognized the need to have a strategy designed to deal effectively and efficiently with such emergencies, whether manmade or natural. As a result, the Overflow Prevention Plan (OPP) was developed and successfully implemented to assume a pro-active/preventive stance, in dealing with emergency situations. The plan allows the Division to maintain a constant state of readiness in order to be able to respond to emergency situations and provide continuous, effective and efficient service to Dade County residents.

The original Overflow Prevention Plan (OPP) was initiated in approximately 1995. Years later, in 2002, approximately one year after the completion of Supervisory Control and Data Acquisition (SCADA) installation in all of the Department's pump stations, it was decided that further technical improvements could be made to the OPP Program. These improvements and their development are the subject of this report and primarily entail the development of a comprehensive WASD Overflow Prevention Program Web application. Throughout this report OPP is referred to, interchangeably, as either a Plan or a Program.

Section 2.0   Overflow Prevention Plan (OPP)

The Overflow Prevention Plan (OPP) is designed to mobilize the Division's personnel to effectively and efficiently respond to any emergency situation affecting the Miami-Dade County area (1,944.5 square miles), whereby prolonged rains and flooding or other occurrence would have an adverse impact on the proper operation of the Miami-Dade Water and Sewer Department's wastewater pumping stations. The OPP Procedures Manual in Appendix 1 was developed and distributed to all Division supervisory personnel in order to ensure uniform implementation. It includes an employee roster with addresses, contact telephone and beeper numbers, pump station numbers and locations, area maps, details of personnel and equipment assignment by work shift; communication instructions, and other pertinent information needed to carry out emergency operations.

To be fully effective in its endeavors OPP operational objectives were identified such as:

- continuous inspections of all pump stations while the OPP is in effect
- monitoring wetwell levels, to include adjustment of upstream flows of lift stations to avoid overflow conditions at the respective discharge manholes
- have crews available to operate portable pumps in case of system capacity deficiencies or loss of electrical power
- have crews available to respond to trouble calls related to power failures, communications, common alarms and to perform emergency repairs
- monitor level of manholes with a history of overflows
- secure availability of tanker trucks for emergency pumping
- have emergency generator maintenance crews available to inspect stations that are operating on emergency power plants
- evaluate all stations with high wetwell levels
- monitor weather reports and radar
- establish contact with all parties outside of the Pump Station Maintenance Division to coordinate services
- have fuel trucks available
- provide for overflow incidents response and clean-up
- have vactor vehicles prepared to assist in clean-up and disinfecting of any sewage overflow incidents
- complete Federal Emergency Management Agency (FEMA) documents when an event is declared a disaster.

The monitoring of the system and implementation of the program is performed from the control room which has extensive computer access to SCADA, the Internet (primarily for radar), and the newly developed OPP Web Application.

2.1   OPP Web Based Application

The heart of the OPP Program is the design and implementation of a Web based OPP application. This application is installed on the County's Intranet Site viewable to all WASD employees with computer access. All rain events and approaching storms are monitored. It is only when an event is declared as an "OPP Event" as described below, that OPP procedures are implemented.

The Overflow Prevention Program (OPP) application has been developed for the Pump Station Maintenance Division (PSMD). It allows operations and management staff to view the status of critical plant and pump station facilities and capture key system parameters in order to analyze the wastewater collection system. During inclement weather in which the transmission system is impacted or when the potential for flooding exists, WASD implements the OPP Plan, with the objective of avoiding overflows in the collection system during such vulnerable periods. The Command Center is fully manned when a storm event is declared an "OPP Event". This determination of an "OPP Event" is made based upon several factors such as:

- amount and intensity of rainfall
- rainfall distribution across The County
- weather forecasts aided by the monitoring of radar
- previous rainfall in consideration of ground saturation and water table elevation
- operational status of the collection and transmission system
- reactions of key pump stations during a storm event
- wastewater treatment plant flows

Supervisory personnel in the Command Center the system using SCADA, Internet access (primarily for weather information), and the OPP Application. This OPP Application provides many useful display screens for monitoring the system and directing the program. These screens are presented below Figures 2-1 (the starting screen) through Figure 2-31. An explanation of the display is provided at the bottom of each figure. For security reasons, a link to the application cannot be provided as part of this report. This report, therefore, attempts to provide a similar functionality using a master flow diagram of the screens. The screen displays are presented and linked by figure number.
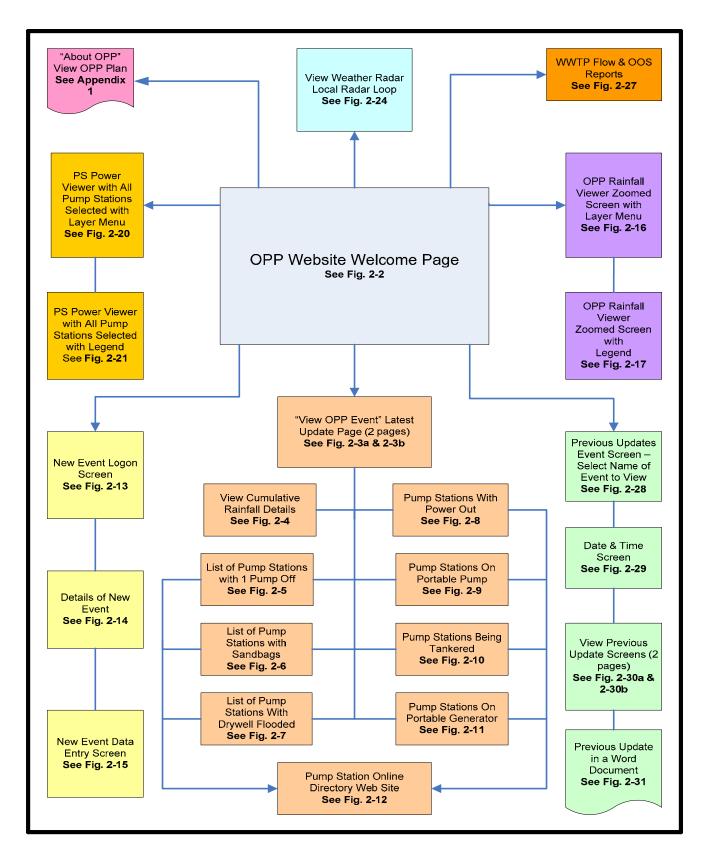
Figure 2-1 Overflow Prevention Program Web Application Master Diagram.
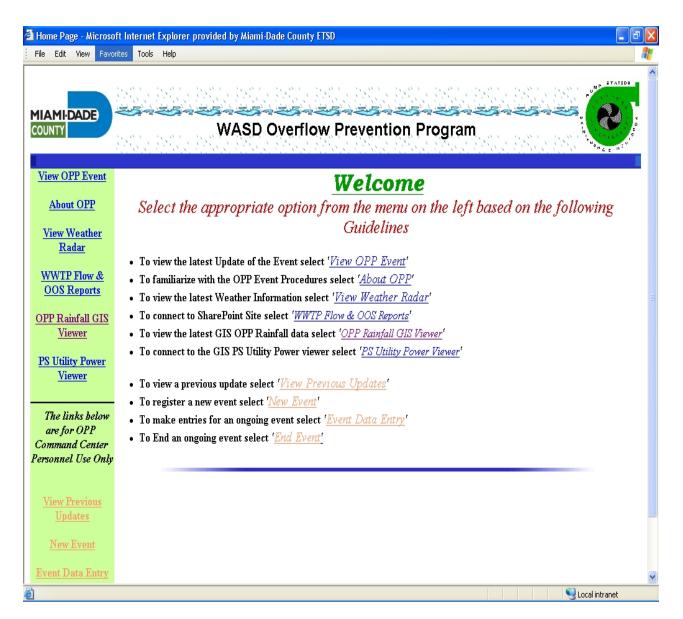
Figure 2-2 OPP Website Application Welcome Page

This is the OPP Website Home Page. Its simplistic design allows users with the most basic computer skills the ability to navigate the site. From this page a user can read about the plan, get real-time radar information from the Internet, obtain treatment plant maximum capacities, graphically view rainfall amounts throughout the county, or graphically view pump station utility power status by clicking on the associated hyperlinks on the left side of the page.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
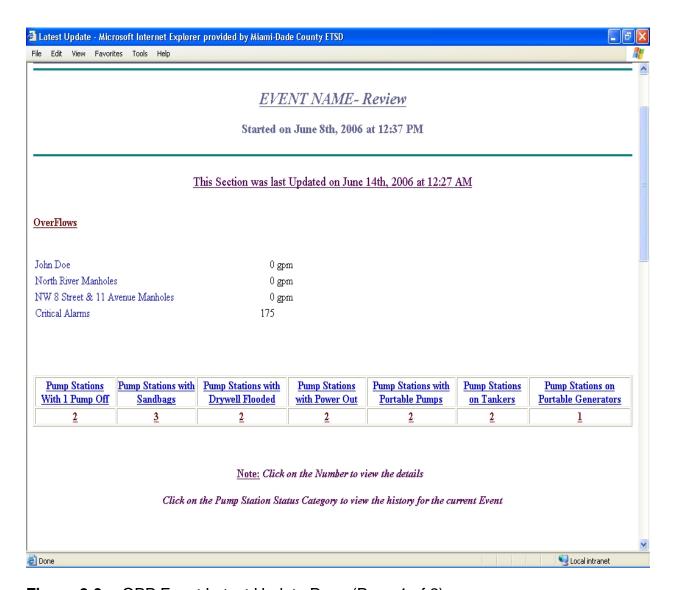
Figure 2-3a OPP Event Latest Update Page (Page 1 of 2)

This is the opening screen viewed when selecting "View OPP Event". It allows the user to view: overflow quantities in key parts of the wastewater system, the total amount of critical alarms being captured by the SCADA system. Other pertinent information monitored include pump stations that have 1 pump off (for flow control), pump stations that have been sandbagged due to localized flooding conditions, pump stations that have drywells already flooded, pump stations that are without utility power, pump stations that are being maintained with portable pumps, pump stations being maintained by tanker trucks, and pump stations that are being maintained by portable generators. The numbers under each category represent the total amount of pump stations under the referenced heading. To view the affected pump station(s), the user would click on either the heading or the total number in the column (**Figures 2-5 to 2-11**). Proceed to **Fig. 2-3b** for the second half of this page containing system data for key pump stations and wastewater treatment plant flows.

Click here back to Master Diagram (Fig. 2-1) for menu choices.

File   Edit   View   Favorites   Tools   Help

Data from SCADA System was Last Updated on June 8th, 2006 at 01:19 PM

Note: *The values in RED indicate the questionable data*

Plant Flows Influent: **Plant Flows Effluent:**

North   South 107.17   Central 72.3   North   South 121.8   Central 103.76

Total 272.33   Total 315.31

P/S A
Suction Pressure	6.68
Discharge Pressure	4.89
Pumps On	0
Flow Direction	North and South to Central

Level John Doe   46.71

P/S B		**P/S C**		**P/S D**		**P/S E**	
Suction Pressure	10.26	Suction Pressure	9.16	Suction Pressure	8.16	W/Well Level	68.73
Discharge Pressure	12.24	Discharge Pressure	21.69	Discharge Pressure	17.91	Discharge Pressure	10.1
Pumps On-High	0	PumpsOn	1	PumpsOn	0	Discharge Flow	2.71
Pumps On-Low	1					Pumps On	1

P/S F		**P/S G**		**P/S H**		**P/S I**	
W/Well Level	86.66	Suction Pressure	9.24	W/Well Level	90.75	W/Well Level	15.65
Discharge Pressure	5.83	Discharge Pressure	18.05	Discharge Pressure	7.98	Discharge Flow	75.93
Discharge Flow	6.44	Pumps On-High	0	Discharge Flow	8.45	Discharge Pressure	13.65
Pumps On	1	Pumps On-Low	1	Pumps On	1	Pumps On	3

METER 1		**METER 2**		**METER 3**		**METER 4**	
Pressure	0	Pressure	7.28	Pressure		Pressure	
East Flow	0	Flow	0.47	East Flow		North Flow	
West Flow	0.09			West Flow		South Flow	

Click here to view Cumulative Rainfall Details Fig. 2-4

Figure 2-3b OPP Event Latest Update Page (Page 2 of 2)

By clicking on the "View OPP Event" hyperlink, the user will open the application to view both **Figure 2-3a and 2-3b** screens to view the current event. This screen allows the user to view the key pumping stations and wastewater treatment plant flows within the transmission system. By having this data on one page, an operator gets a snapshot view of the system which aids in their ability to make informed decisions quickly. The data is refreshed every 6 minutes from the Department's SCADA system. The user can toggle to the rainfall screen allowing them to view the cumulative rainfall totals at selected sites throughout the transmission system.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
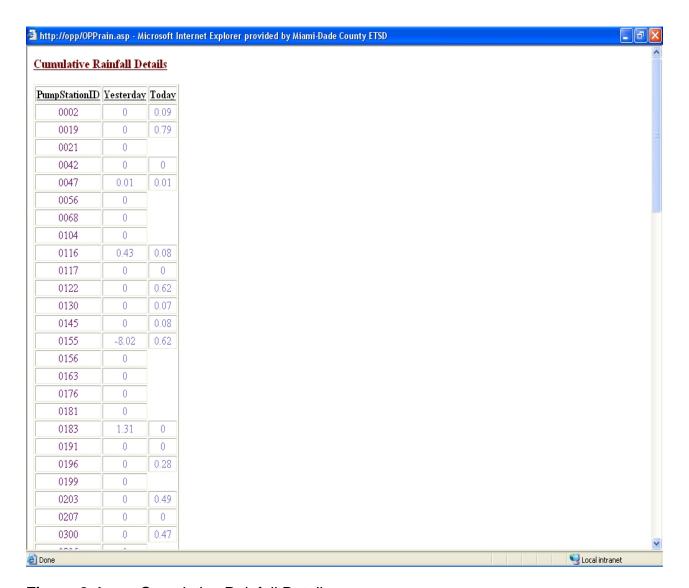
Figure 2-4   Cumulative Rainfall Details

This is the pop-up screen which is displayed when the "View Cumulative Rainfall Details" link at the bottom of **Fig. 2-3b** is selected. The previous 24 hour details are displayed along with the current cumulative amounts.

Click here back to Master Diagram (Fig. 2-1) for menu choices.

Figure 2-5   List of Pump Stations with 1 Pump Off.

This is the screen observed when the Pump Stations with 1 Pump Off heading or total is selected. It allows the user to see which pump station(s) has 1 pump off due to a failure or operational need. The recorded date and time indicates when the information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station can be obtained by clicking on the pump station number in the web application or on **Fig. 2-12** for this simulation. This would send the user to the Pump Station Online Directory.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
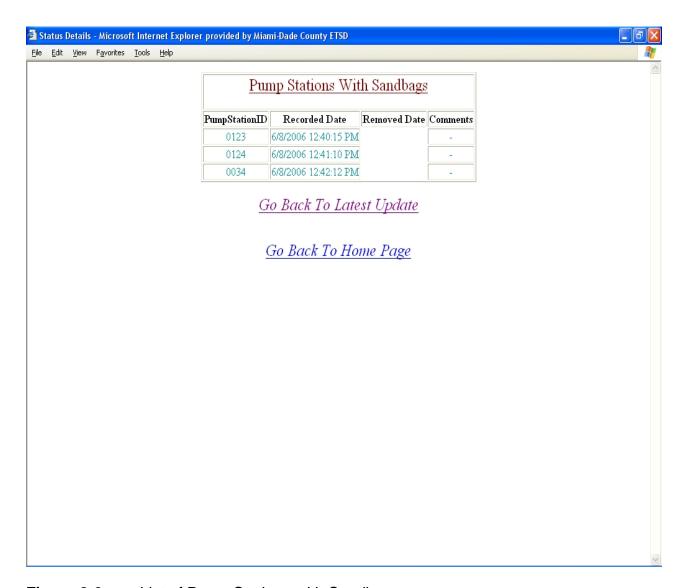
Figure 2-6 List of Pump Stations with Sandbags

This is the screen observed when the Pump Stations with Sandbags heading or total is selected. It allows the user to see which pump station(s) have sandbags placed to prevent flooding of the drywell due to a flooding condition. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**)

Click here back to Master Diagram (Fig. 2-1) for menu choices.

Figure 2-7   List of Pump Stations with Drywell Flooded

This is the screen observed when the Pump Stations with Drywell Flooded heading or total is selected. It allows the user to see which pump station(s) have been affected and the time information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**)

Click here back to Master Diagram (Fig. 2-1) for menu choices.
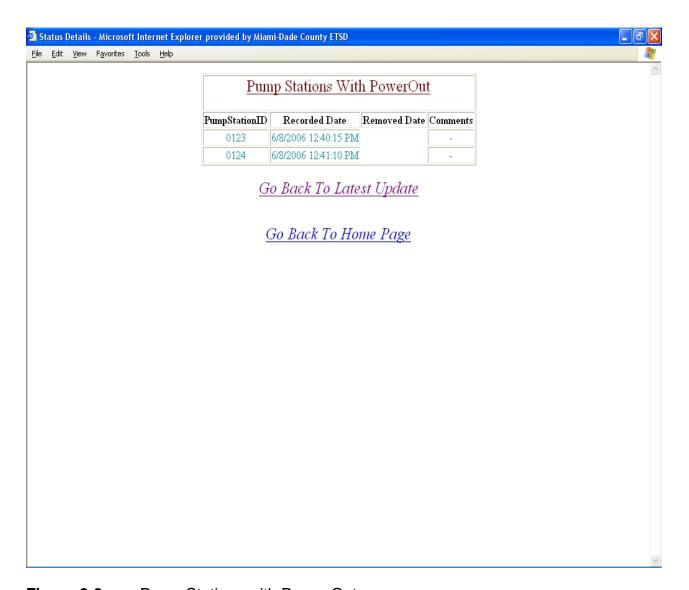
Figure 2-8 Pump Stations with Power Out

This is the screen observed when the Pump Stations with Power Out heading or total is selected. It allows the user to see which pump station(s) has been affected due to a loss of utility power. The recorded date and time indicates when the information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**)

Click here back to Master Diagram (Fig. 2-1) for menu choices.

Pump Stations With PortablePumps

PumpStationID	Recorded Date	Removed Date	Comments
0123	6/8/2006 12:40:15 PM		-
0034	6/8/2006 12:42:12 PM		-

Go Back To Latest Update

Go Back To Home Page
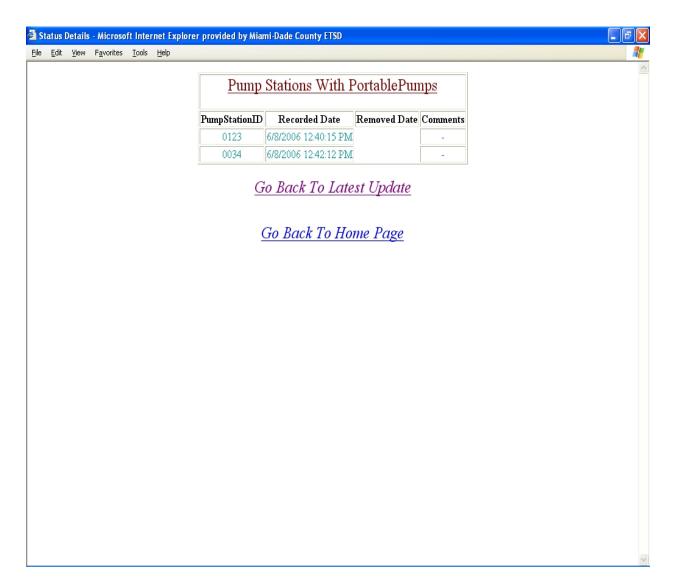
Figure 2-9   Pump Stations on Portable Pumps

This is the screen observed when the Pump Stations with Portable Pump heading or total is selected. It allows the user to see which pump station(s) are being maintained by a portable pump. The recorded date and time indicates when the information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**).

Click here back to Master Diagram (Fig. 2-1) for menu choices.
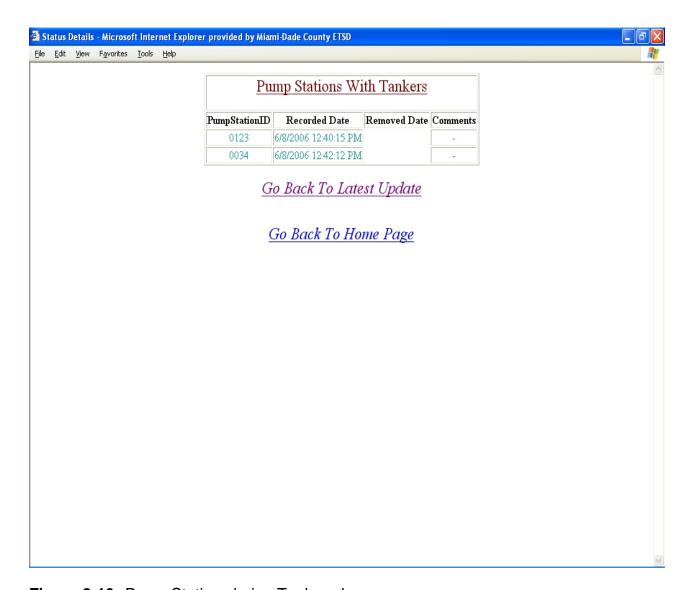
Figure 2-10 Pump Stations being Tankered

This is the screen observed when the Pump Stations with Tankers heading or total is selected. It allows the user to see which pump station(s) are being maintained by use of a tanker truck(s). The recorded date and time indicates when the information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**).

Click here back to Master Diagram (Fig. 2-1) for menu choices.
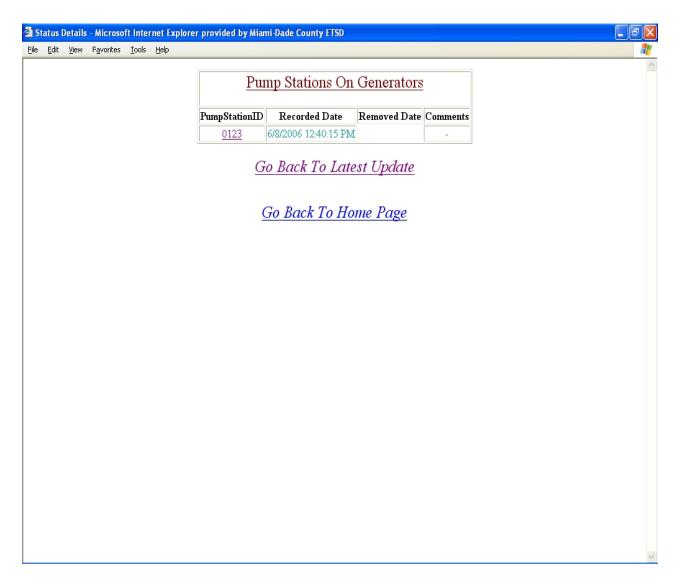
Figure 2-11 Pump Stations on Portable Generator

This is the screen observed when the Pump Stations on Portable Generators heading or total is selected. It allows the user to see which pump station(s) are being maintained by use of a portable generator due to the loss of utility power. The recorded date and time indicates when the information was entered into the system. The removed date is used for reporting purposes to track when the problem was corrected or condition returned to normal. Any additional information would be viewed in the comments section. Further detailed information regarding the pump station could be obtained by clicking on the pump station number. This would send the user to the Pump Station Online Directory (see **Fig. 2-12**).

Click here back to Master Diagram (Fig. 2-1) for menu choices.
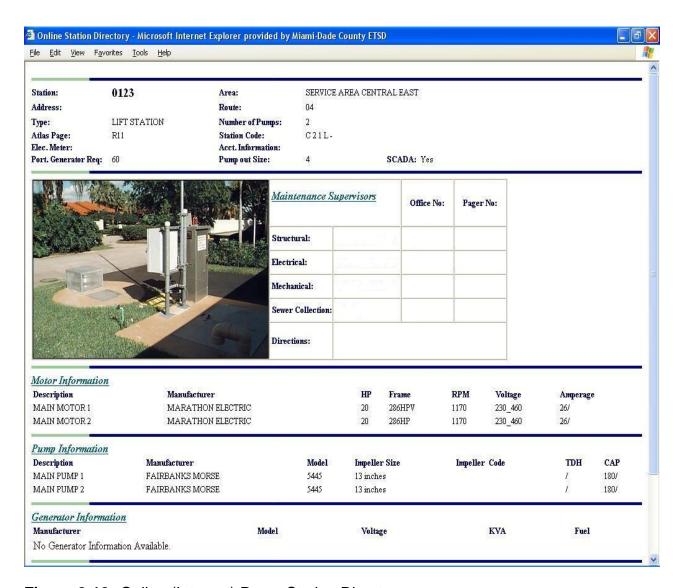
Figure 2-12 Online (Intranet) Pump Station Directory

This is the information screen from the Pump Station Online Directory. It allows a user to obtain information such as appearance of the facility and surroundings, address, contact persons, number of pumps, hp, voltage, and capacity. Should a portable generator or pump be required, information is available to determine the appropriate size required to meet the current need. This screen is made available from all pump station number hyperlinks thru-out the application. This present screen is used as a sample for all links to the Pump Station Directory.

Click here back to Master Diagram (Fig. 2-1) for menu choices.

Figure 2-13 New Event Logon Screen

Information gathered during an OPP event is entered into the application by 2 methods, either manual by the OPP Command Center personnel or loaded directly via data transfer from the SCADA system. The system is password protected so that only the command center personnel have access. Proceed to **Figure 2-14**.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
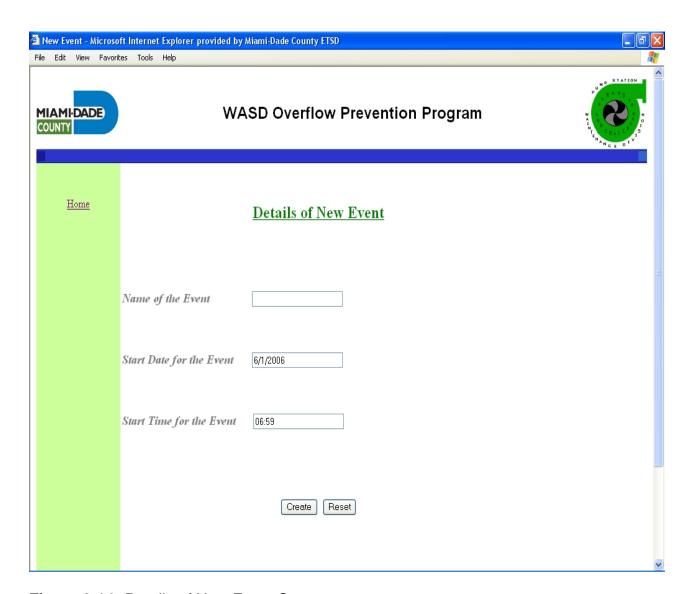
Figure 2-14 Details of New Event Screen

Once the command center personnel have logged into the system, a new event must be created. The name of the event is all that needs to be entered at this point. Proceed to **Fig. 2-15**.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
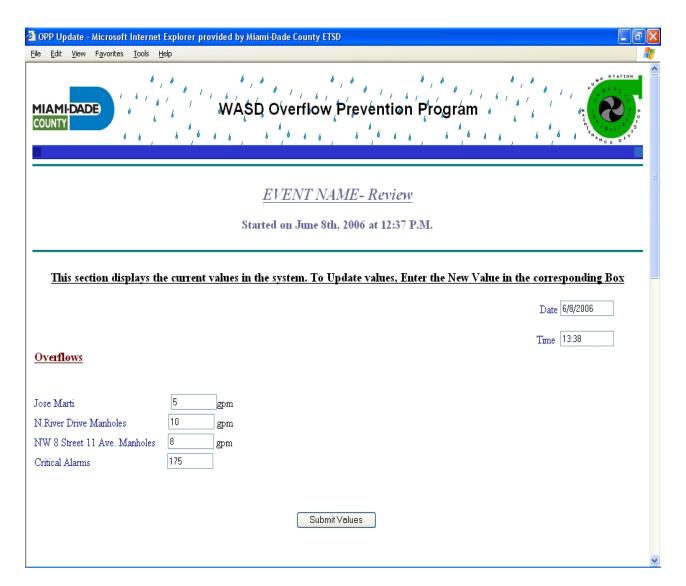
Figure 2-15 New Event Data Entry Screen

Once the event is created, the command Center personnel then begin entering data as it is collected. The information for the points of overflow is gathered from field units performing manual inspections along identified points of concern. The Critical Alarms information is a total of current alarms collected from the SCADA system.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
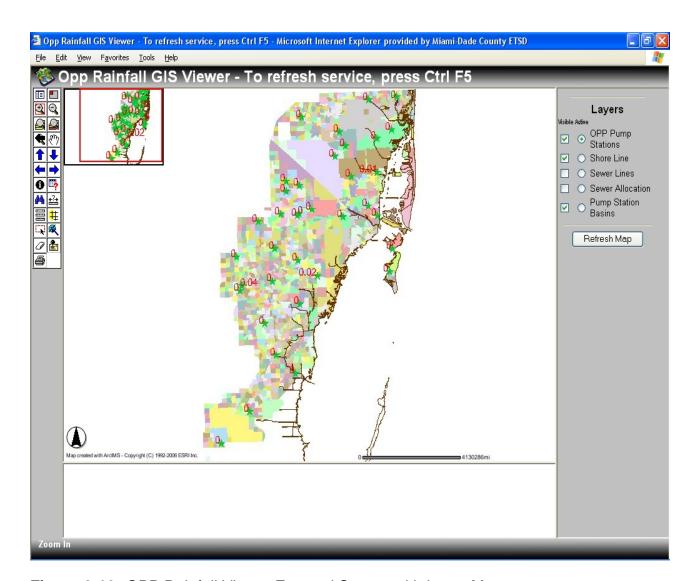
Figure 2-16 OPP Rainfall Viewer Zoomed Screen with Layer Menu

This Rainfall Viewer screen uses GIS technology in conjunction with MDWASD rain gages to display the inches of rainfall throughout the County. This view is shown with the "Layer" menu, and can be zoomed-in or out as desired. Proceed to **Fig. 2-17** to see the view with a Legend.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
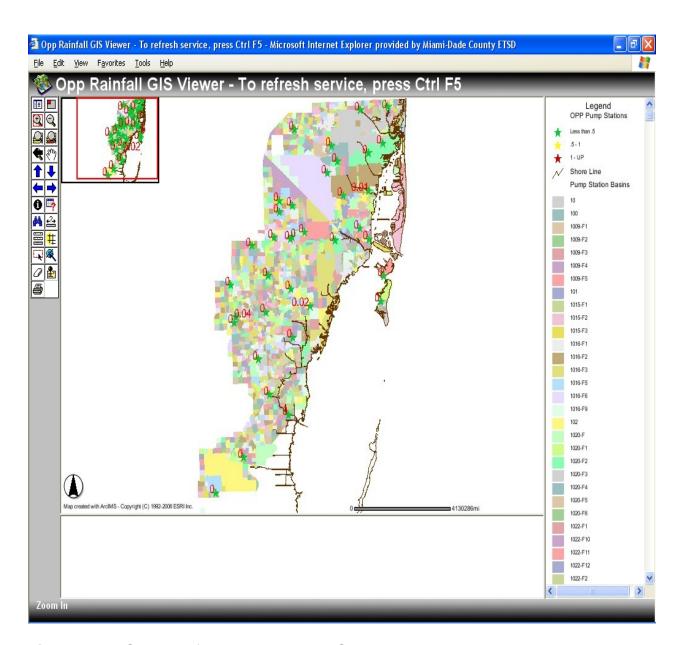
Figure 2-17 OPP Rainfall Viewer Zoomed Screen with Legend

This Rainfall Viewer screen uses GIS technology in conjunction with MDWASD rain gages to display the inches of rainfall throughout the County. This screen presents the previously displayed Rainfall Viewer in Figure 2-16 with a legend as opposed to the 'Layer" menu. The same zoom-in and out feature exists.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
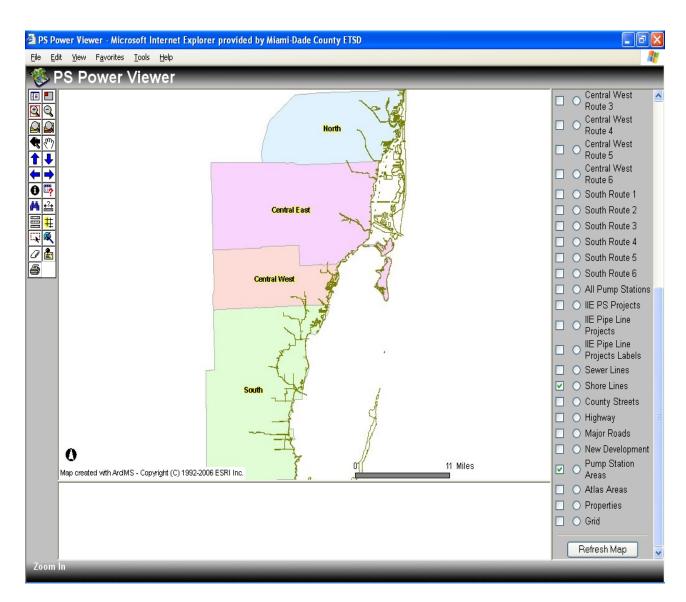
Figure 2-18 PS Power Viewer with the Layer Menu

The GIS Power Viewer displays the pump stations having no power. This opening view is shown with a "Layer Menu", and requires further zooming in order to display the pump stations without power. Proceed to Figure **2-19** to view the PS Power Viewer with a Legend. The "Route" layer allows the ability to display only those stations without power in the specified route.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
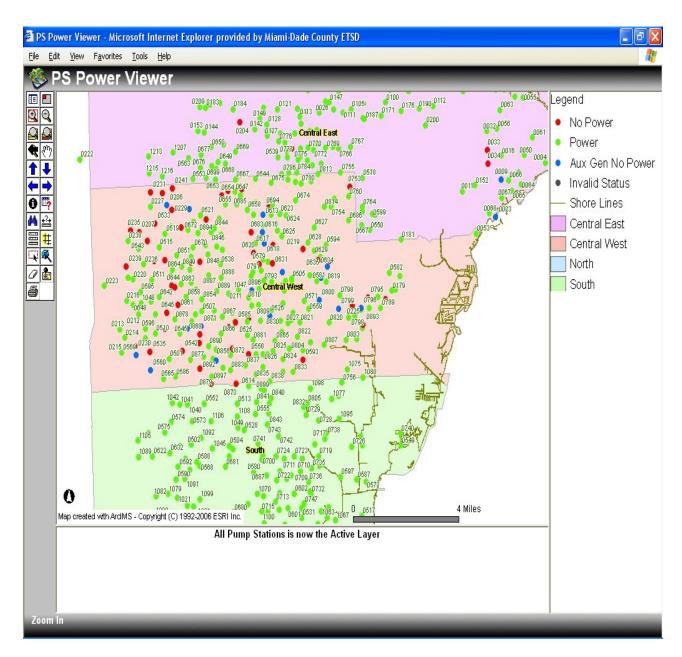
Figure 2-19 PS Power Viewer with Legend

This GIS Power Viewer display presents the pump stations having no power and with a legend on the right side.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
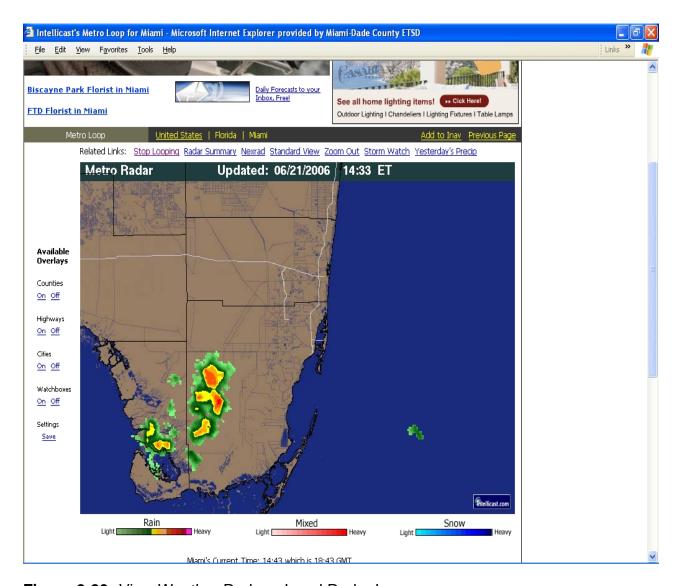
Figure 2-20 View Weather Radar – Local Radar Loop

The use of radar is vital in making decisions for reactive activities. Due to the cost and ease of access via the Internet, we use the Intellicast Website for radar imagery. This site is available by selecting the "View Weather Radar" link on the Welcome screen. This link directs the user to Intellicast's metro looping screen. Links from this Website provide access to regional and long range radar loops, allowing the monitoring of larger areas.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
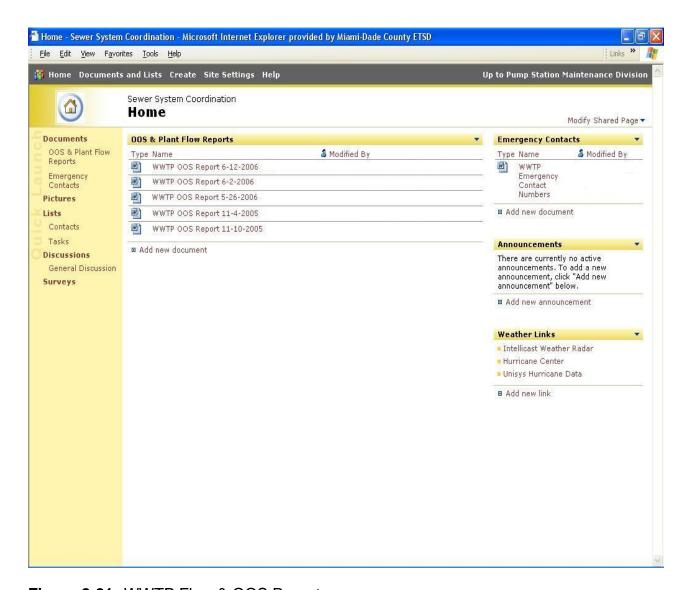
Figure 2-21 WWTP Flow & OOS Reports

By selecting the "WWTP Flow & OOS Reports" link the user is directed to the Sewer System Coordination Home Page. Due to the continuous maintenance being performed within the transmission and treatment systems, coordination is critical to be able to redirect flows within the system without having any mishaps. To be effective requires extensive communication between several maintenance entities. To provide increased communication, a collaborative site was built using Microsoft's SharePoint software. From this site, a user can access the latest OOS equipment lists, emergency contact numbers, weather radar, and hurricane information.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
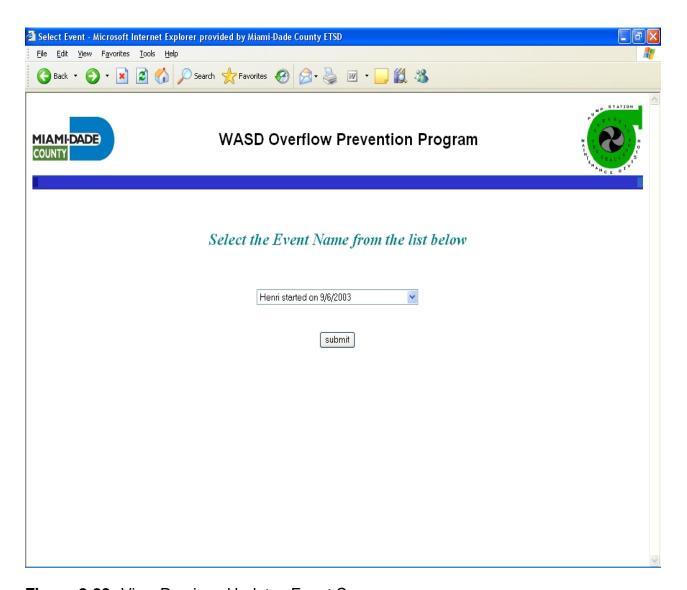
Figure 2-22 View Previous Updates Event Screen

To view previous updates or events, the user would select the "View Previous Update" link. This screen would allow the user to select the current event, view a previous update or provide the ability to view another event. Proceed to **Fig. 2-23**.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
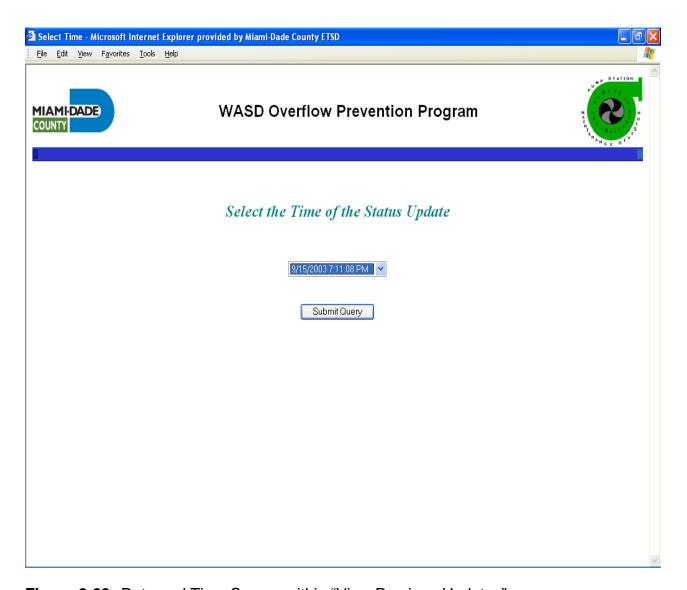
Figure 2-23 Date and Time Screen within "View Previous Updates"

Once the event has been chosen, the user is prompted to select a date and time. The times are shown at several minute intervals, and each provides a snapshot of the system data at that moment. The next screen viewed is shown in **Figures 2-24a** and **2-24b**.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
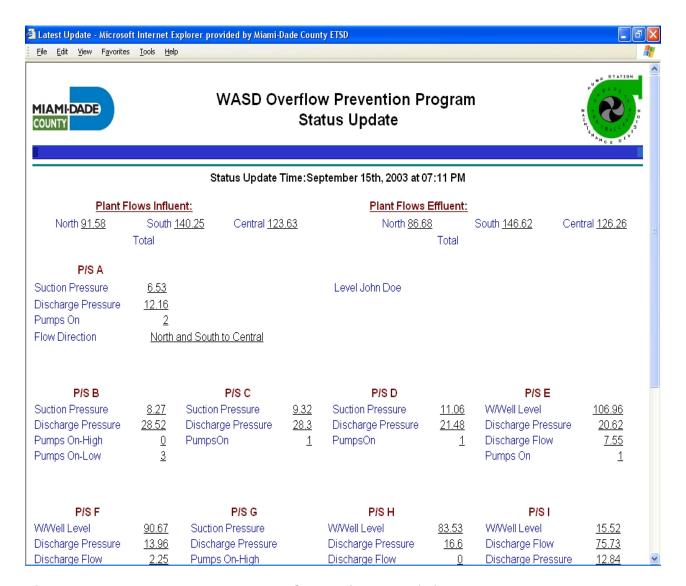
Figure 2-24a Previous Update Screen (Page 1 of 2)

This is the top half of the screen displaying previous data collected as indicated by the updated time. The next screen (**Fig. 2-24b**) displays the bottom half of this page.

Click here back to Master Diagram (Fig. 2-1) for menu choices.
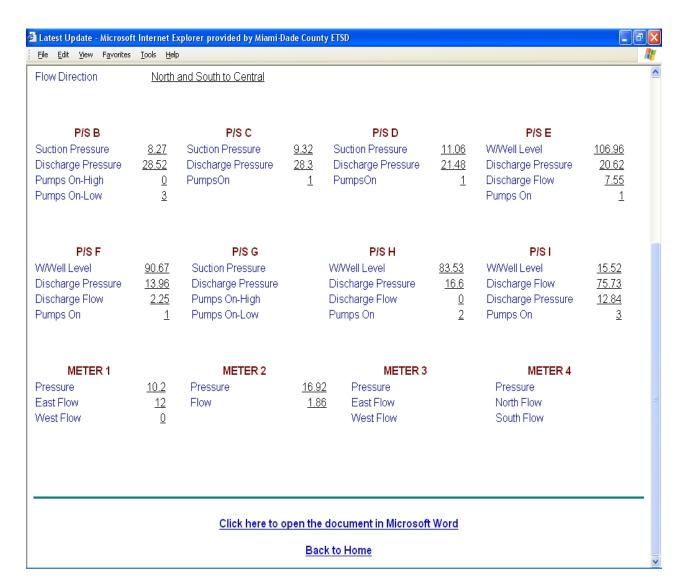
Figure 2-24b   Previous Update Screen (Page 2 of 2)

This is a continuation of the "Previous Update" screen.

Click here back to Master Diagram (Fig. 2-1) for menu choices.

WASD Overflow Prevention Program- Status Update
Status Update Time: September 15th, 2003 at 07:11 PM

<div align="center">

Plant Flows Influent: **Plant Flows Effluent:**

</div>

North   91.58   South   140.25 Central 123.63   North   86.68   South   146.62 Central 126.26

Total   Total

Level John Doe

P/S A	
Suction Pressure	6.53
Discharge Pressure	12.16
Pumps On	2
Flow Direction	North and South to Central

P/S B		P/S C		P/S D		P/S E	
Suction Pressure	8.27	Suction Pressure	9.32	Suction Pressure	11.06	W/Well Level	106.96
Discharge Pressure	28.52	Discharge Pressure	28.3	Discharge Pressure	21.48	Discharge Pressure	20.62
Pumps On-High	0	PumpsOn	1	PumpsOn	1	Discharge Flow	7.55
Pumps On-Low	3					Pumps On	1

P/S F		P/S G		P/S H		P/S I	
W/Well Level	90.67	Suction Pressure		W/Well Level	83.53	W/Well Level	15.52
Discharge Pressure	13.96	Discharge Pressure		Discharge Pressure	16.6	Discharge Flow	75.73
Discharge Flow	2.25	Pumps On-High		Discharge Flow	0	Discharge Pressure	12.84
Pumps On	1	Pumps On-Low		Pumps On	2	Pumps On	3

METER 1		METER 2		METER 3		METER 4	
Pressure	10.2	Pressure	16.92	Pressure		Pressure	
East Flow	12	Flow	1.86	East Flow		North Flow	
West Flow	0			West Flow		South Flow	

Figure 2-25   Previous Update Screen converted to a Word Document

Selecting the "Open the Document in Microsoft Word" link opens the data in a Microsoft Word Document. This can readily be forwarded or utilized in a report as required.

Click here back to Master Diagram (Fig. 2-1) for menu choices.

All of the above OPP Program information is available to MDWASD employees through the County's Intranet. The collection of system information is performed by SCADA in six minute intervals and provides for detailed reporting during the storm and after the storm. The reporting allows upper management to become better informed during and after significant storm events. The reporting ability also provides the means of examining the system's storm response and OPP Plan effectiveness after an event. The information is collected and examined in debriefing meetings scheduled after the storm event. A sample debriefing meeting PowerPoint presentation is provided for Hurricane Katrina in Appendix 2.

The information obtained through this program not only aids the PSMD in monitoring the events, it also aids in allocating its resources and making well informed business decisions aimed at preventing overflows.

Section 3.0 Program Development

3.1 Existing Program Assessment

Prior to this application being in place, during an OPP Event, the staff at the Pump Station Maintenance Division would collect the information pertaining to the status at various pump stations and other relevant parameters on an hourly basis from the Supervisory Control and Data Acquisition (SCADA) system. This information was compiled and faxed to upper management on an hourly basis for the duration of the event. This information was later fed into a database manually. There was no process in place to generate real time reports and charts to analyze the trends in the various parameters and make timely well-informed decisions. Instead these were created after completion of the event. Hence there was a redundancy in terms of the data entry involved and a significant under utilization of the data for highly critical decision-making.

3.2 OPP Website Technical Development

The OPP application developed is primarily a web site that contains various functions to capture and view point-in-time data and critical information related to the wastewater system.

The OPP application is database driven and web enabled. It receives data from the SCADA system and allows the entry of information by personnel manning the OPP Command Center. The SCADA system provides real-time remote monitoring and control of devices located in plant and pump station facilities. A SQL Loader file transfers the data from SCADA to an Oracle database every 6 minutes. This data is later used to analyze the event and performance of the wastewater system during the event.

The user interface, developed using HTML scripts and ASP files, allows the user to create, view, and modify entries related to an OPP event. The data entry involves the capturing of information not available through SCADA, such as, the pump stations with sandbags, pump stations with drywell flooded, pump station on tankers, etc. The application also provides links to view the weather radar information for the Miami area and rainfall values for rain gauges monitored by WASD. Available through the department's Intranet, the application allows interested managers to view status and information on the event.

The OPP application also incorporates GIS technology on its web site. Two GIS viewers have been developed that allow users to view data on an interactive map. These viewers were developed using ESRI's ArcIMS software. The OPP Rainfall GIS Viewer displays the pump stations being affected during a rain event by showing the amount of rain measured by the rain gauges. This facilitates easy identification of pump stations heavily affected by the rain event and allows management to target these stations to prevent any major problems.
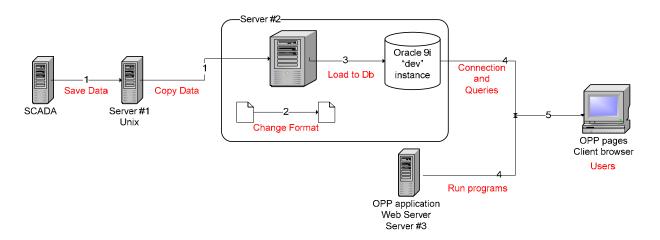
The GIS PS Power Viewer operates similarly to the Rainfall GIS Viewer, displaying pump stations having no power.

The OPP application web site also takes advantage of Microsoft Windows SharePoint Services. A SharePoint site was created as a collaboration tool that allows plant, pump station, and collection system personnel to share information relevant to the operations of the sewer system. Reports, announcements, emergency contacts are posted on the SharePoint site that aid in decision-making related to routing of flow from the collection system to the plants. For instance, OPP Command Center personnel access the SharePoint site to learn of any key equipment that is out of service at the plants. In addition, information on maximum flow capacity for each plant is posted. The OPP application provides a link to the SharePoint site.

The following OPP Application Development Notes present technical development information, and are not provided as a map for designing a similar application elsewhere. It is extremely specific to MDWASD's system, and is provided solely to show the hardware and extensive design effort involved in the handling of databases, tables, and file transfers. The design for this application was performed by MDWASD's MIS Division.

ORACLE Essential Requirements for Emergency Activation

OPP Diagram

1- Data from SCADA is saved on Server #1 and copied into Server #2 with the script OPP_new_test.csh.

2- The format of the text file received is modified with the script OPP.csh.

3- The same script runs the SQL*Loader to load the data in the OPP schema of the Oracle 'dev' database. The SQL*Loader software must be installed on Server #2.

4- The OPP application is on the Web Server (Server #3). Oracle file connection (sqlnet.ora) and ODBC component must be installed on this Web server. The system DSN name for the ODBC is 'newwms.'

5- Clients access the application typing OPP in the browser address bar or from the WASD intranet.

As 09/14/04

Figure 3-1   OPP Server Diagram

OPP Application Development Notes

The design of the OPP application primarily consists of 2 main components.

1. The data transfer between SCADA to the Oracle Database.
2. The database driven web component of the application for the user to create, view and modify entries pertaining to OPP Event

DESIGN OVERVIEW

The application on the whole satisfies the following objectives.

1. Transfer SCADA Data into Oracle database periodically (presently every 6 minutes)
2. Provide the interface for the user to create a new event, make entries for an ongoing event and end an event.
3. Populate the tables created for Generating Status Reports every 15 minutes.
4. Functionality to view the status update for an ongoing event and also to view the status update for a previous event
5. Provide links within the application to view the weather radar information for Miami area.
6. View the rainfall values for the previous day as well as the cumulative for the day pump station wise.

Transfer SCADA Data into Oracle database periodically (presently every 6 minutes)

- Using SQL Loader file the data is transferred into OPP_TS_TEMP_SCADA.

- 2 AFTER INSERT TRIGGERS TR_OPP_SCADA_INS and TR_SCADA_SQLLOAD are fired subsequently to populate the values into OPP_MI_Meter_Info, OPP_TPSD_Temp_PS_Details and OPP_ScadaStatusUpdate

Data Entry By the user in the Web Interface

- The web interface permits authenticated users to create a new event. The OPP_Event table gets populated with the Event details entered by the user.

- The application allows authenticated users to make entries for an ongoing event. These entries get inserted/updated into OPP_TPS_Temp_Pump_Station and OPP_StatusUpdate.

- An authenticated user can end an ongoing event. The OPP_Event table, then gets updated.

Populate the Status Update Tables

- While a user creates a new event, the OPP_Event table gets inserted with a new record and an AFTER INSERT TRIGGER TR_NEW_EVENT is fired.
- The above trigger basically calls MY_JOB.SUBMIT function which then runs the job PR_STATUS_UPDATE procedure every 15 minutes.
- The PR_STATUS_UPDATE procedure populates the tables in the following fashion. When an ongoing event is ended, the trigger TR_END_EVENT is fired. This trigger removes the PR_STATUS_UPDATE procedure from the queue.

View the status update for an ongoing event & for a previous event

- The status update values are retrieved from the tables with the red border as denoted in Figure 3-2.
- The latest update values for an ongoing event are retrieved from the tables with the black border in Figure 3-2.

View the rainfall Information

- There are 2 sets of values retrieved for the rainfall- one being the rainfall values for the previous day and the other set is the cumulative value for the current day.
- These values are retrieved pump station wise
- The values for the previous day are retrieved from the SHPMP system.
- The cumulative values for the current day are retrieved from the OPP_TS_TEMP_SCADA table, which gets updated periodically- currently every 6 minutes.
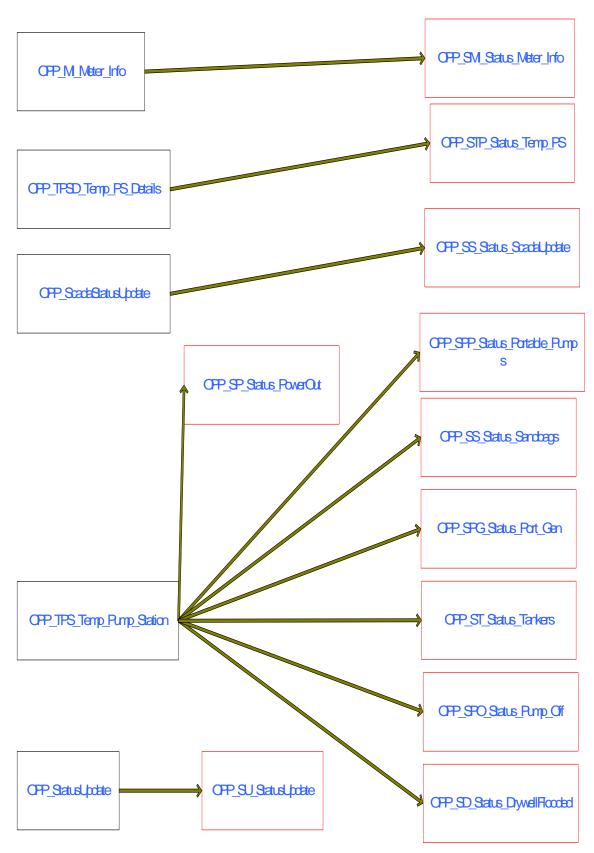
Figure 3-2   Data Transfer Diagram

OPP APPLICATION DESIGN OVERVIEW
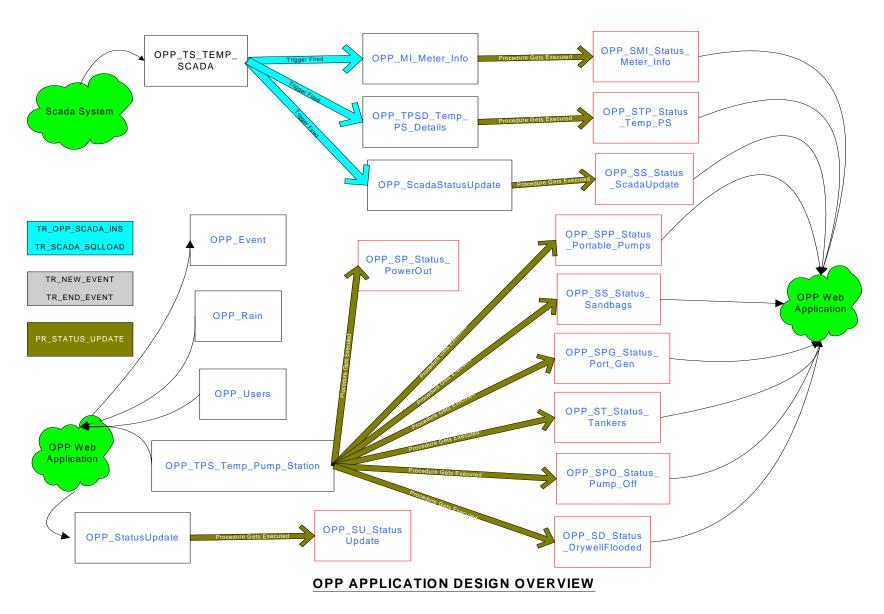
Figure 3-3　　OPP Application Design Overview

Footnotes:

- PR_STATUS_UPDATE is the Procedure to populate the tables for Reporting function.
- TR_NEW_EVENT, TR_END_EVENT, TR_OPP_SCADA_INS, TR_SCADA_SQLLOAD are Database triggers.
- The boxes in red indicate the tables, which form part of the reporting or 'Status Update' function.
- The boxes with the black border represent the rest of the tables.

TABLE STRUCTURE

OPP_SCADASTATUSUPDATE

EntryNo NUM, NotNull
EventNumber NUM
PlantNDIn NUM(10,2)
PlantNDInFlag VARCHAR2(5)
PlantCDIn NUM(10,2)
PlantCDInFlag VARCHAR2(5)
PlantSDIn NUM(10,2)
PlantSDInFlag VARCHAR2(5)
TotalIn NUM(10,2)
TotalInFlag VARCHAR2(5)
PlantNDEf NUM(10,2)
PlantNDEfFlag VARCHAR2(5)
PlantCDEf NUM(10,2)
PlantCDEfFlag VARCHAR2(5)
PlantSDEf NUM(10,2)
PlantSDEfFlag VARCHAR2(5)
TotalEf NUM(10,2)
TotalEfFlag VARCHAR2(5)
LevelJoseMarti NUM(10,2)
LevelJoseMartiFlag VARCHAR2(5)
DateOfEntry DATE

OPP_TPS_TEMP_PUMP_STATION

EntryNo NUM, NotNull
EventNumber NUM
PumpStationID VARCHAR2(5)
PumpOffRecorded DATE
PumpOffRemoved DATE
SandBagsRecorded DATE
SandBagsRemoved DATE
DryWellFloodedRecorded DATE
DryWellFloodedRemoved DATE
PowerOutRecorded DATE
PowerOutRemoved DATE
PortablePumpsRecorded DATE
PortablePumpsRemoved DATE
TankersRecorded DATE
TankersRemoved DATE
PortableGeneratorsRecorded DATE
PortableGeneratorsRemoved DATE
Comments VARCHAR2(150)

OPP_TPSD_TEMP_PS_DETAILS

EntryNo NUM, NotNull
EventNumber NUM
PumpStationID VARCHAR2(5)
DischargeFlow NUM(10,2)
DischargeFlowFlag VARCHAR2(5)
WWellLevel NUM(10,2)
WWellLevelFlag VARCHAR2(5)
FlowDirection VARCHAR2(6)
FlowDirectionFlag VARCHAR2(5)
SuctionPressure NUM(10,2)
SuctionPressureFlag VARCHAR2(5)
DischargePressure NUM(10,2)
DischargePressureFlag VARCHAR2(5)
PumpsOnHigh NUM(10,2)
PumpsOnHighFlag VARCHAR2(5)
PumpsOnLow NUM(10,2)
PumpsOnLowFlag VARCHAR2(5)
EntryDate DATE

OPP_M_METER_INFO

EntryNo NUM, NotNull
EventNumber NUM
MeterNumber VARCHAR2(8)
Pressure NUM(10,2)
PressureFlag VARCHAR2(5)
Flow NUM(10,2)
FlowFlag VARCHAR2(5)
EastFlow NUM(10,2)
EastFlowFlag VARCHAR2(5)
WestFlow NUM(10,2)
WestFlag VARCHAR2(5)
NorthFlow NUM(10,2)
NorthFlowFlag VARCHAR2(5)
SouthFlow NUM(10,2)
SouthFlowFlag VARCHAR2(5)
EntryDate DATE

OPP_SS_STATUS_SCADALPDATE

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PlantNDIn NUM(10,2)
PlantCDIn NUM(10,2)
PlantSDIn NUM(10,2)
TotalIn NUM(12,2)
PlantNDEf NUM(10,2)
PlantCDEf NUM(10,2)
PlantSDEf NUM(10,2)
TotalEf NUM(12,2)
DateOfEntry DATE

OPP_SU_STATUSUPDATE

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
OverflowJoseMarti NUM(10,2)
LevelJoseMarti NUM(10,2)
OverflowNRiver NUM(10,2)
LevelNRiver NUM(10,2)
OverflowNW8Street NUM(10,2)
LevelNW8Street NUM(10,2)
CriticalAlarms NUM(10)
DateOfEntry DATE

OPP_SM_STATUS_METER_INFO

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
MeterNumber VARCHAR2(8)
Pressure NUM(10,2)
Flow NUM(10,2)
EastFlow NUM(10,2)
WestFlow NUM(10,2)
NorthFlow NUM(10,2)
SouthFlow NUM(10,2)
EntryDate DATE

OPP_SP_STATUS_POWEROUT

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_USERS

User_ID NUM(10,2), NotNull
FirstName VARCHAR2(10)
LastName VARCHAR2(10)
UserID VARCHAR2(6)
Password VARCHAR2(6)

OPP_TS_TEMP_SCADA

EntryNo NUM, NotNull
PTID NUM
Value NUM(10,2)
Quest VARCHAR2(4)
TimeStamp DATE
TimeOfEntry DATE

OPP_ST_STATUS_TANKERS

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_STATUSUPDATE

EntryNo NUM, NotNull
EventNumber NUM
OverflowJoseMarti NUM(10,2)
OverflowNRiver NUM(10,2)
LevelNRiver NUM(10,2)
OverflowNW8Street NUM(10,2)
LevelNW8Street NUM(10,2)
CriticalAlarms NUM(10,2)
DateOfEntry DATE
TimeOfEntry DATE

OPP_SS_STATUS_SANDBAGS

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_SPP_STATUS_PORTABLE_PUMPS

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_STP_STATUS_TEMP_PS

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
DischargeFlow NUM(10,2)
WWellLevel NUM(10,2)
FlowDirection VARCHAR2(6)
WestFlow NUM(10,2)
NorthFlow NUM(10,2)
SouthFlow NUM(10,2)
EntryDate DATE

OPP_EVENT

EventNumber NUM, NotNull
EventName VARCHAR2(30)
StartDate DATE
StartTime DATE
EndDate DATE
EndTime DATE
CreationDate DATE

OPP_SD_STATUS_DRYWELLFLOODED

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_SPO_STATUS_PUMP_OFF

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

OPP_SPG_STATUS_PORT_GEN

EntryNo NUM, NotNull
StatusUpdate NUM
EventNumber NUM
PumpStationID VARCHAR2(5)
EntryDate DATE

Figure 3-4   Table Structure of OPP Database

Table 3-1   Description of the Script Files

FILE NAME	PURPOSE
Accessdenied.html	This is the page, which gets displayed when the user login fails.
Connection. asp	This script contains the connection logic to the database. The script establishes a DSN less connection. This script is included in all the files, which need to connect to the database. Hence any changes in the future in terms of the database connection need to be made only in this file.
Default	Home page for the application
Detailps.asp	The script is to retrieve the details for a particular status category during an event including the Recorded date and Removed date.
Detailps2.asp	This script does the same function as Detailps.asp, the only difference being it would be used for authenticated user while making the data entries for an ongoing event.
Endevent.asp	To end an ongoing event. Collects relevant details from the user.
Endeventaction.asp	The action page, which processes the information, collected from the user for ending an ongoing event. This page updates the OPP_Event table and also removes the procedure PR_STATUS_UPDATE from the job queue.
Latestupdate.asp	Retrieves the latest update values for an event from the various tables.
Latestupdateuser.asp	Functionally, same as latestupdate.asp, however, this page checks whether the user is authenticated. This page actually would allow the user to check for the latest update values while being logged in to make the entries for an event.
Login.htm	This is the login screen for creating a new event.
Login2.htm	This is the login screen for making entries for an ongoing event.
Login3.htm	This is the login screen for ending an ongoing event.
Newevent.asp	Collects information for creating a new event.
Neweventaction.asp	Contains the processing logic for creating a new event. This updates the OPP_Event table with the new entries. It also fires the trigger TR_NEW_EVENT that starts the procedure PR_STATUS_UPDATE and puts it in the job queue.
Newpsstatusaction.asp	Processing logic for adding a new pump station status.
Newstatusupdate.asp	Collects the information on Pump Station Statuses and Flow details for an ongoing event.
Pending.asp	Allows the user to update the existing status information for Pump Stations once the event is ended.
ProcessLogin.asp	Validates the user while creating a new event by checking with OPP_Users
ProcessLogin2.asp	Validates the user while making entries for an ongoing event by checking with OPP_Users
ProcesssLogin3.asp	Validates the user while ending an ongoing event by checking with OPP_Users

FILE NAME	PURPOSE
Psdetail.asp	When the user clicks on the total count against the pump station status categories in latestupdate.asp, the script retrieves the break up information of the pump stations.
Pserror.htm	Displays an error message for invalid pump station entries while creating a new pump station status.
Rain.asp	Retrieves the rain information from the SHPMP as well as from SCADA signals received every 6 minutes.
Selectevent.asp	This script retrieves the Event information from the database and displays as a list box
Selecteventaction.asp	Retrieves the status updates available for an ongoing event.
Statusupdateprint.asp	Opens the status update information in Word format.
Updateps.asp	Updates the status update status for a pump station by deleting it.
Userstatusupdateaction.asp	Collects the status update entries from the users and updates the database.

Section 4.0   Program Results

4.1   Sanitary Sewage Overflow (SSO) Analysis

The following SSO analysis was performed in an effort to show the effects of the OPP Program in the reduction of SSOs in general, but more specifically those SSOs related to pump stations, severe storms and in some cases capacity related. Figure 4.1 presents a table of SSO, rain and severe storm data between the years 1994 and 2005.

Since the early 1990s MDWASD's collection and transmission has seen significant improvements, many of which were in response to regulatory actions (Consent Decrees and Settlement Agreements). It is, therefore, difficult to ascertain the specific effect of the OPP Program implementation on the reduction of SSOs. In an effort to obtain some indication of the Program's effectiveness in reducing SSOs, it was anticipated that this eleven year analysis would provide the following results:

- a partial contribution in the reduction of SSOs at pump stations. Most of these reductions would probably be due to improvements performed in maintaining compliance with regulatory actions.
- a reduction in SSOs that occur in severe storm events. The effect here was anticipated to be greater since this program was implemented for these events.
- The greatest effect was anticipated in the reduction of capacity related SSOs in severe storm events. The program is structured to address known problem areas of the system, and more importantly to uncover other future potential problem areas through examination of system response information after the storm. It should also be noted that the debriefing meetings held after major storm events is integral in providing upper management with system information. This knowledge provides an atmosphere of cooperation by substantiating the need for obtaining additional resources for OPP Plan response improvements and further SSO reductions.
- a reduction in the number of days storm related SSOs occur in the aftermath of a storm event was to some degree expected. PSMD input subsequently noted that almost immediately after mid 1990 improvements, which opened up the system, flows returned to normal more quickly, shortening the aftermath effects of heavy storm event rainfall on the system.

As **Table 4-1** indicates, there have been significant reductions in the number of pump station related SSOs, pump station and severe storm related SSOs, and pump station capacity and severe storm related SSOs. It should be noted that there have been no pump station capacity related SSOs since 2000. The table also shows a steady reduction in the number of days SSOs occur after the day of the initial storm event. Yearly and daily (per storm event) rainfall amounts, and the number of severe storm events are also provided in the table. This information can at most provide a qualitative view of the continual improvements in SSO reduction, even in years with more severe storms.

The most "out of place" information in the table is obviously the number of SSOs in 2005. A closer analysis of this year can actually show the need and benefits of the OPP Program. It should be noted that electric service was lost at approximately 80% of the Department's pump stations in the second of two storm events, Hurricane Katrina and Hurricane Wilma,

respectively. Almost the entire County was without power, some of it for several weeks. Previous storm events recorded in this table have never had this degree of power outage. At the same time, there were no significant rain amounts associated with these storms. Power outages were primarily attributed to trees falling on power lines due to the strong winds, a condition not experienced since Hurricane Andrew in 1992, and one MDWASD had no control over. A look at the Debriefing Presentation in Appendix 2 reveals that because of power loss experienced in Hurricane Katrina, the first and lesser of the two storms, SCADA communication problems hindered some of the program's implementation. In Hurricane Wilma, the second storm, these problems were greatly magnified. Despite the problems, the number of SSOs were kept low considering that there are almost 1000 pump stations in the system. The program's effectiveness was further indicated by the fact that the reporting functions of the program, including the debriefing meeting after the storm event, exposed the problems which were immediately experienced again on a larger scale in the second hurricane. This knowledge was instrumental in keeping the number of SSOs as low as they were in Hurricane Wilma, and as the Program was designed, will allow for improvements which anticipate reducing or eliminating similar problems in future.

PUMP STATION RELATED SANITARY SEWER OVERFLOW (SSO) ANALYSIS IN SEVERE STORMS

DESCRIPTION	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Pump Station related SSOs	120	66	25	22	19	13	15	3	5	5	5	26
Pump Station and Severe Storm related SSOs	48	12	0	0	6	9	3	0	0	0	0	18
Pump Station and Severe Storm and Capacity Related SSOs	48	11	0	0	5	8	3	0	0	0	0	0
Pump Station and Severe Storm related SSOs attributed to Loss of Electrical Service	0	0	0	0	0	4	0	0	0	0	0	16
Rainfall in Inches for the Year	79.57	79.05	57.25	70.48	70.33	63.89	61.05	72.48	63.29	72.13	54.44	68.21
Number of Severe Storms	1	1	0	0	1	1	1	2	0	0	0	2
Rainfall inches 1st Severe Storm Event Days 1 & 2	1.15/3.41	4.86/3.5	n/a	n/a	1.03/3.59	3.47/6.81	2.61/12.56	2.62/2.08	n/a	n/a	n/a	0/0
Rainfall inches 1st Severe Storm Event Days 3 & 4	1.16/0	1.33/1.86	n/a	n/a	2.92/1.08	n/a	n/a	3.33/0	n/a	n/a	n/a	n/a
Rainfall inches 2nd Severe Storm Event Days 1 & 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.72/4.71	n/a	n/a	n/a	n/a
Rainfall inches 2nd Severe Storm Event Days 3 & 4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.49/0	n/a	n/a	n/a	n/a
Number of Days of SSOs related to a Severe Storm Event - Days of Aftermath /Recovery	8	9	n/a	n/a	8	7	4	2 & 1	n/a	n/a	n/a	4 & 12

General Notes:

1) Pump station related primarily indicates an overflow at or caused by a pump station

2) Severe storms are major Tropical Storms, Hurricanes, and storms with significant rain amounts - more than can be reasonably expected to design for. The shaded columns are years in which there were severe storms.

3) Capacity related as it pertains to pump stations implies the pumps were not capable of handling the flows. Note that in the case of storms beyond the design capacity storm (2 year) an improvement would not necessarily be required. Electrical Failure and I/I are also not included.

4) Rainfall is measured at the Miami International Airport

Table 4-1 PS Related SSO Analysis in Severe Storms

4.2   Cost Analysis

The following, in **Tables 4-2**, **4-3**, and **4-4**, is a cost analysis associated with recovery during and in the aftermath of Hurricane Francis in September of 2004. The total PSMD costs associated with this storm amount to approximately $378,569. This analysis is rough and was only provided as a reference to use in conjunction with the size of the collection and transmission system provided in this report's introduction, and in the SSO Report provided as one of the other three SSO Abatement Project Reports.

Pump Station Maintenance Division
Hurricane Frances Cost Estimates

Pump Station	Protective Measures	Operational Costs During Storm	Initial Damage Assessment Costs	Debris Removal	Recovery Costs			Total Costs	Comments
					Buildings	Equipment	Operations		
PSMD	$135,425	$11,802	$130,030				$75,813	$353,069	
0004						$1,000		$1,000	Broken driveshaft
0102				$1,000				$1,000	Tree Removal
0106				$1,000				$1,000	Tree Removal
0120				$1,000				$1,000	Tree Removal
0170					$10,000			$10,000	Damaged Roof
0192						$5,000		$5,000	Noisey/vibrating pump
0215						$2,000		$2,000	Electrical Feeder
0394						$2,500		$2,500	Rebuild motor & pump due to drywell flooding
0478				$1,000				$1,000	Tree Removal
0536				$1,000				$1,000	Tree Removal
Report Total:	$135,425	$11,802	$130,030	$5,000	$10,000	$10,500	$75,813	$378,569	

Number of days for "Protective Measures": 2.5

Operational costs during the storm: "On Call Personnel"

Report Does not reflect any fuel costs

Table 4-2   Hurricane Francis Cost Estimates

Personnel Costs

Classification	Average Salary	Overtime Rate	OT with OH Rate	Number of Positions	Total Salary per Classification	On Call during the storm	Assessment Costs	Operations
Accountant 1	$13.70	$20.55	$34.94	1	$13.70		$454.16	$454.16
AO III	$26.19	$39.29	$66.78	1	$26.19		$868.20	$868.20
Administrative Secretary		$0.00	$0.00	1	$0.00			
Chief	$46.36	$46.36	$71.86	1	$46.36		$934.15	$1,293.44
OSS I	$9.88	$14.82	$25.19	1	$9.88			
OSS II	$11.66	$17.49	$29.73	3	$34.98			
Plant Electrician	$26.16	$39.24	$66.71	49	$1,281.84	$6,403.97	$41,625.79	$83,251.58
Plant Mechanic	$22.05	$33.08	$56.23	34	$749.70	$5,397.84	$23,390.64	$730.96
W&S Account Clerk	$13.07	$19.61	$33.33	3	$39.21		$866.54	$433.27
W&S Assistant Maint Supt	$44.30	$44.30	$68.67	3	$132.90		$2,677.94	$892.65
W&S Data Entry Specialist	$15.29	$22.94	$38.99	1	$15.29			$506.86
W&S Information Technology Specialist	$26.06	$39.09	$66.45	1	$26.06		$863.89	$863.89
W&S Maintenance Mechanic	$17.99	$26.99	$45.87	20	$359.80		$11,331.00	$596.37
W&S Maintenance Repairer	$13.54	$20.31	$34.53	19	$257.26		$8,079.32	$448.85
W&S Plant Electrical Supervisor	$33.81	$50.72	$86.22	4	$135.24		$4,483.21	$1,120.80
W&S Plant Maintenance Supervisor	$30.68	$46.02	$78.23	8	$245.44		$4,068.17	$1,017.04
W&S Secretary	$15.33	$23.00	$39.09	5	$76.65			$508.19
W&S Semi-Skilled Laborer	$11.80	$17.70	$30.09	5	$59.00		$1,955.85	$391.17
W&S Structural Maintenance Supervisor 1	$25.55	$38.33	$65.15	4	$102.20		$3,387.93	$846.98
W&S Structural Maintenance Supervisor 2	$32.69	$49.04	$83.36	1	$32.69		$1,083.67	$1,083.67
W&S Structural Maintenance Worker	$20.65	$30.98	$52.66	37	$764.05		$23,959.16	$684.55
	$416.87			202	$4,368.55	$11,801.81	$130,029.61	
	8				8			
	$3,334.96				$34,948.40			
					$54,170.02			

Table 4-3   Personnel Costs

PSMD RECOVERY COSTS ASSOCIATED WITH OPERATIONS

	9/5/2004			9/6/2004			Grand Totals	Operational Costs
	Shift 1	Shift2	Totals	Shift 1	Shift2	Totals		
Accountant 1	1		1	1		1	2	$454
AO III	1		1	1		1	2	$868
Administrative Secretary			0			0	0	$0
Chief	1		1	1		1	2	$934
OSS I			0			0	0	$0
OSS II			0			0	0	$0
Plant Electrician	27	20	47	27	13	40	87	$34,688
Plant Mechanic	15	13	28		3	3	31	$2,193
W&S Account Clerk	1	1	2	1		1	3	$433
W&S Assistant Maint Supt	2	1	3	2		2	5	$1,785
W&S Data Entry Specialist			0			0	0	$0
W&S Information Technology Specialist		1	1			0	1	$0
W&S Maintenance Mechanic	9	7	16	9	2	11	27	$6,560
W&S Maintenance Repairer	9	10	19	9	1	10	29	$4,489
W&S Plant Electrical Supervisor	2	3	5	2	2	4	9	$4,483
W&S Plant Maintenance Supervisor	3	4	7	3		3	10	$3,051
W&S Secretary			0			0	0	$0
W&S Semi-Skilled Laborer	3		3	3		3	6	$1,174
W&S Structural Maintenance Supervisor 1	2	2	4	2		2	6	$1,694
W&S Structural Maintenance Supervisor 2		1	1			0	1	$0
W&S Structural Maintenance Worker	19	17	36	19		19	55	$13,006
	95	80	175	80	21	101		$75,813

Table 4-4   PSMD Recovery Costs Associated with Operations

Section 5.0   Conclusion

5.1   Summary of Benefits

As with most any program, the assessment of effectiveness is viewed from its cost versus benefit. In this case, the cost of not being proactive with this program in the reduction of SSOs is too difficult to quantify. The costs without the program would involve significant regulatory agency civil penalties. Though these costs are high, the biggest cost involves the potential effects to public health and safety; no dollar amount can be placed on this item. Some of the benefits realized from the OPP Program include:

- a reduction in severe storm and capacity related SSOs.
- more informed critical decision making during severe storm events.
- efficient use of employees. Employees are borrowed from other Department Sections specifically for "OPP Events". This prevents over hiring in order to handle infrequent events.
- efficient use of equipment.
- promotes upper management involvement through access to real time reporting of system data, allowing them to become better informed during and after significant storm events.
- reduction in regulatory penalties through reduction in SSOs.
- a library of system information providing an increasing understanding of the collection and transmission system through storm event reporting functions. This in turn provides better decision making for future system improvements.
- availability of 6 minute data for future use. The present SCADA system is set up for providing an hourly average of 3 minute data. The 6 minute data can provide information not viewable using the hourly averaged data.
- reduction of costs to County Residents. The Department's allocations for emergencies are withdrawn from operation and maintenance budgets, having a negative impact for taxpayers as utility rates may be increased as a result.
- reduction in design costs in light of regulatory SSO requirements. It is impractical to design to eliminate SSOs. This program allows for using reasonable design criteria and managing the system to reduce or prevent SSOs in emergencies and catastrophic storm events.
- promotes public health and safety.

5.2   Future Improvements

The full implementation of this program was probably best realized a couple of years ago with the latest improvement being the incorporation of GIS. The fact is this program is never fully implemented as it is always evolving, utilizing the latest technologies.

The most immediate need for improvements involves the conversion of the SCADA system to a MS Windows operating environment. This type of conversion requires extreme coordination

between Users and implementation personnel in order to reduce problems occurring during the transition. Other improvements include more automation of the system. Several of the reporting functions are accomplished by employees continually contacting the command center during a storm event. Several of these reported items, stations on portable generators, stations without power, etc. can be automated through incorporating them into the SCADA reporting system.

Another improvement includes the real time monitoring of groundwater elevation. This is presently being performed on a very limited scale in the System Optimization Pilot Study, one of the other three SSO Abatement Program Reports. High groundwater elevation prior to a storm event can limit the ability of a collection and transmission system to handle significant storm events. Other miscellaneous improvements to the OPP Web Application including additional information and revised displays are always being discussed for design and implementation.

Being able to predict the effects of a storm on the collection and transmission system and the treatment plants requires the ability to predict the intensity of an on-coming storm, where the storm is heading, and relating this to the locations of pump station basins. A tool claiming this ability is presently being procured. It involves a subscription service furnished by companies such as Meterologix, OneRain, and Calamar. The service provides the tools, in conjunction with Doppler Radar, to overlay the GIS map of the system and provide storm intensity and location, and direction of movement. The rain intensity and location accuracy of some is claimed down to inches within a square meter.

Additionally, numerous upgrades to the SCADA system are underway. Included are on-line flow computation, determination of actual pump operating efficiencies, connection of actual system operation to computer models for on-the-spot system analysis, and the development of graphic displays using a link to GIS systems.

In summary, the Overflow Prevention Plan (OPP) is a practical, evolving strategy designed to deal with threats to the integrity of Dade County's wastewater system, and enhances the Department's responsiveness to its constituency. The OPP is a cost saving program that meets emergency challenges head-on in keeping with the County's mission of "Delivering Excellence Every Day".

Appendices

Appendix 1 Overflow Prevention Plan (OPP) Manual

MIAMI-DADE WATER & SEWER DEPARTMENT

PUMP STATION MAINTENANCE DIVISION

*OVERFLOW * PREVENTION * PLAN*

(OPP)

Revised 7/18/05

TABLE OF CONTENTS

GENERAL

The Pump Station Maintenance Division has identified the need for an Overflow Prevention Plan (OPP). The Overflow Prevention Plan is designed to mobilize the Division's personnel to effectively and efficiently respond to emergency conditions affecting the Miami-Dade County area, whereby prolonged rains and flooding would impact on the proper operation of the Miami-Dade Water and Sewer Department's wastewater pumping stations.

IMPLEMENTATION

Once the potential for an emergency situation has been identified and approved by he WASD director, the Chief of the Pump Station Maintenance Division shall contact the Communication Center and request that all affected personnel be notified that the Overflow Prevention Plan (OPP) is in effect.

After being paged, affected personnel should contact the Chief of the Pump Station Maintenance Division or the Assistant Superintendents to confirm their availability.

While this plan is in effect, the regular work shifts and personnel availability shall be restructured to allow for continuous 24-hour coverage.

Additional personnel and assistance is to be requested from the **Plant Maintenance, General Maintenance, Sewage Collection, and Customer Service Divisions,** as may be required to carry out the emergency operations as specified throughout the OPP.

It will be necessary to maintain overlapping shifts for the purpose of providing continuous 24-hour coverage and support during the time the OPP is in effect, to include Saturdays, Sundays, and Holidays if necessary.

- ➤ The **first shift** shall be in effect from **8:00 A.M.** through **9:00 P.M.** or as deemed necessary to accommodate the conditions.

- ➤ The **second shift** shall be in effect from **8:00 P.M.** through **9:00 A.M.** or as deemed necessary to accommodate the conditions.

OPERATIONAL OBJECTIVES

In order to be fully effective in our endeavors, the following operational objectives have been identified as well as the sections and units responsible to fulfill each objective with our **current** staffing:

OBJECTIVE I
OPP NOTIFICATION

Responsibility: Communication Center

❖ Once an emergency situation has been declared, the Pump Station Maintenance Division Chief will contact the Communications Center and request that the Overflow Prevention Plan (OPP) Group be notified that OPP is in effect. The Communication Center Manager will notify the Sewage Collection Division to request to continue or discontinue with the Department's Sewer Service Protocol.

Operational Objectives:

To Serve the Department as a support unit and continue its role of transmitting and receiving information regarding water/sewer complaints and emergencies.

➢ Commence special monitoring and dispatching of SCADA alarms

➢ Monitoring for three critical SCADA alarms:
   o Common/High Level
   o AC Failure
   o Station Flooding

❖ These critical alarms will be monitored at two SCADA workstations and will be broken down into two (2) service group, Central East and North on one (1) workstation, and Central West and South on the other.

❖ When common/high level alarms are identified

   ▪ The alarm will be reset
   ▪ A station display will be printed out and documented
   ▪ A common alarm log will be kept accordingly

   A. A copy will then be scanned and placed in a Shares Folder. (TBD)

      ❖ A/C failure and station flooding alarms will be dispatched immediately to field supervisor or the Pump Station Division OPP Command Center.

B. A designated person from the Administrative Support Section will print out a copy for the OPP Command Center.

C. Once completed, the electronic copies will be moved to the archive folder created for the event.

Staffing:

❖ When OPP is put into effect, the Communications Center will be staffed by two 12-hour shifts.

❖ The 12-hour shift will start at 8:00am or 9:00 pm, or 8:00 pm or 9:00 am, depending on the on the event start, or as determined by the Communications Manager.

❖ Should the need arise for additional staff to answer phone calls, a request will then be made to the Customer Service Division for Customer Relations Representatives. This would require a minimum of four representatives.

Objective II
OPP COMMAND CENTER SET-UP TO MONITOR OPERATIONS

Responsibility: Pump Station Maintenance Division Management

❖ The Command Center is set up for the Division Chief, Assistant Superintendents, Administration Section AO3, and designated supervisors are to be assigned to the Westwood Lakes Conference Room/Communication Center to monitor the collection and transmission system through telemetry, radio, and trouble calls.

A. Duties are assigned throughout 13-hour shifts in order to provide 24-hour coverage, with one hour overlap between shifts in order to finish work and update incoming personnel on the status of assignments.

B. Personnel assigned to each shift is to:

➢ Coordinate and monitor the operation of stations as listed in Objective VII.

➢ Operate the booster pump stations and coordinate with the Wastewater Treatment Plants and other Divisions.

➢ Evaluate all stations with high wetwell levels, monitor weather reports and radar.

➢ Issue status reports to upper management, when requested.

Responsibility: **Division Management Center (continued)**

> ➢ Establish contact with all parties outside of the Pump Station Maintenance Division for assistance.

> o As requested throughout the implementation of this Plan, in an effort to strengthen deficiencies as they may surface, meetings are to be held to review and evaluate actions and directions.

> (Appendix B2).

Objective III
SECURE AVAILABILITY OF TANKER TRUCKS FOR EMERGENCY PUMPING

Responsibility: **OPP Command Center**

❖ During OPP operations, Command Center personnel are to procure and maintain, on standby status, eight (8) tanker trucks. Two trucks are to be assigned to each Service Area.

❖ Three (3) of the 8 tanker trucks are to be procured from the Wastewater Treatment Section for the Central District.

> A. For the supplementary tanker trucks the contact person is:

> > ➢ X
> > PAGER   (XXX) XXX-XXXX
> > WORK   (XXX) XXX-XXXX
> > CELLULAR (XXX) XXX-XXXX

> B. Work shifts for drivers need to be identified for purposes of scheduling drivers.

❖ Licensed drivers for these tankers are to be selected from the Water Distribution, Sewage Collection or General Maintenance Division.

❖ CDL License is required.

<u>**OBJECTIVES IV**</u>
ESTABLISH EMERGENCY GENERATOR MAINTENANCE CREW
TO INSPECT STATIONS THAT ARE OPERATING ON EMERGENCY POWER PLANTS

Responsibility: **Plant Maintenance Division and its**
Plant Diesel Maintenance Supervisor

❖ The Diesel Maintenance Unit is to handle all calls for generator failures/service or repairs. The crews are to inspect the generators to ensure that they are operating during this period.

❖ One crew is to be tasked with simultaneous coverage of two Service Areas:

North and Central East - - - - - - - - - - - - 1 crew
South and Central West - - - - - - - - - - - 1 crew

(Crew Requirements: Appendix B-B1).

❖ The Diesel Maintenance Unit may also be called to assist the maintenance crews as required.

GENERAL COMMENTS:

All Supervisors are to record generator run-times on respective log sheets, as well as all pertinent information, as required by F.E.M.A. and the Environmental Regulatory Agencies to include all expenses. If an event is declared a disaster, this information is to be delivered within 48 hours to the Pump Station Maintenance Division Administration Support Section. The applicable forms and contact lists are attached.

<u>**OBJECTIVE V**</u>

ESTABLISH CREWS TO MAINTAIN PORTABLE PUMPING OPERATIONS CREATED
BY SYSTEM CAPACITY DEFICIENCIES OR LOSS OF ELECTRICAL POWER

Responsibility: **Structural Maintenance Supervisors**

❖ Secure availability of fuel trucks from General Maintenance Division.

❖ The Command Center personnel are to procure and maintain contact to ensure the availability of on-call personnel for fuel trucks, as needed, to fuel the portable pumps, generators, and tanker trucks.

❖ These fuel trucks are to be supervised by

> X
  Pager   (*XXX*) *XXX-XXXX*
  Cellular   (*XXX*) *XXX-XXXX*
  Radio   System *X* - Group *X*

❖ Supervise pumping crews to pump down stations with high wetwell levels to avoid overflow conditions.

❖ Establish three (3) pumping crews per Service Area for each shift.

❖ Crews composed of two (2) Structural Maintenance Workers will be responsible for securing the structural integrity of wastewater pump stations, as well as providing support to other maintenance crews performing emergency operations.

❖ Additionally, crew members may serve as helpers to emergency pumping crews, or as necessary to prevent/control sewage overflows and its associated cleaning and disinfecting processes.

❖ The Plant Maintenance and General Maintenance Divisions will be called on to provide help for additional crews as necessary.

OBJECTIVE VI
ESTABLISH CREWS TO RESPOND TO TROUBLE CALLS

Responsibility: Corrective and Predictive Maintenance Crews

❖ The **Plant Electrical and Plant Maintenance Supervisors** for each Service Area are to assign the task of responding to trouble calls generated by the Communication Center to three (3) maintenance crews.

❖ To perform electrical and mechanical repairs at the pump stations as required.

❖ To respond to power failures high alarms, trouble calls for high wetwells, pump failures, and other repairs as needed.

❖ Each shift crew is to cover two routes (See Appendix B) for each shift.

<u>**OBJECTIVE VII**</u>
**ESTABLISH CREWS FOR ANY MAJOR OR HEAVY REPAIRS THAT CANNOT
BE COMPLETED BY THE TROUBLE CALL CREW**

Responsibility: **OPP Command Center**

<u>**OBJECTIVE VIII**</u>
PROVIDE PERSONNEL FOR STATIONS THAT NEED CONTINUOUS MONITORING

Responsibility: **Section Assistant Superintendent or Electrical/Plant
Maintenance Supervisors.**

❖ The assigned Assistant Superintendent or the Electrical and Plant Maintenance
Supervisors directing the efforts for each Service Area are to assign personnel to
continuously monitor the following pump stations to ensure proper operation during
the time that OPP measures are in effect:

North - - - - - - - - - - - - -   Stations D, F, G
Central East - - - - - - - - -   Stations A
Central West - - - - - - -   Stations B, C
South - - - - - - - - - - - - -   Stations J, K

❖ **Emergency power plants will be activated at Pump Stations A,B,C,D,F,G,J and
K, as required.**
(Crew requirements: Appendix B).

<u>**OBJECTIVE IX**</u>
**MIAMI-DADE WASD – FLORIDA POWER AND LIGHT ELECTRICAL
MONITORING AND COORDINATION OF SERVICES**

Responsibility: WASD Energy Management Coordinator

➢ X
Telephone   (*XXX*) *XXX-XXXX*
Pager   (*XXX*) *XXX-XXXX*
Cellular   (*XXX*) *XXX-XXXX*

❖ The Energy Management Coordinator serve, as the OPP Command Center liaison
with the power utilities.

❖ Reports all power outages to power utilities.

❖ Provides hourly updates on power restoration and estimated times for power
restoration.

<u>**OBJECTIVE X**</u>
MONITOR ALL PUMP STATIONS WHILE THE OPP IS IN EFFECT

Responsibility: **Electrical and Plant Maintenance Supervisors**

❖ To assemble and dispatch personnel as detailed in Appendix B. To monitor and inspect the (6) Routes in each Service Area (See Appendix C). Mechanical and electrical crews from each Service Area are to be assisted by Structural Maintenance personnel from that Service Area. **SCADA** is to be used to monitor the status of pump stations.

❖ The crews are to inspect each route fully, resetting all alarms, making notations in logbooks and reporting any "high level" condition and potential problems to the assigned Service Area's Electrical and Plant Maintenance Supervisor. This information is to be documented by the Electrical and Plant Maintenance Supervisors and relayed to the Command Center at the end of each shift.

<u>**OBJECTIVE XI**</u>
IDENTIFICATION OF ALL RE-PUMP STATIONS

Responsibility: **Plant Maintenance Supervisors**

❖ Identify re-pump stations and monitor wetwells levels.

❖ Adjust upstream flows of lift stations to avoid overflow conditions at the respective discharge manholes (See Appendix B for crew requirements).

<u>**OBJECTIVE XII**</u>
MONITOR LEVELS AT JOSE MARTI PARK, SOUTH AND
NORTH RIVER DRIVES AND BISCAYNE INTERCEPTOR ROUTE

Responsibility: **Sewage Collection Division**

❖ The TV and Grout Section of the Sewage Collection Division is to be tasked with the Jose Marti Park and Biscayne Interceptor Routes (Appendix D).

a) These routes include specific manholes to be monitored and these crews are to maintain a written report on the levels and report these to the Command Center on a periodic basis.

b) These efforts will be coordinated between the OPP Command Center at WWL Maintenance Facility by the Chief of Sewage Collection Division.

> Cellular (*XXX*) *XXX-XXXX*
> Pager   (*XXX*) *XXX-XXXX*
> Radio   System *X* - Group *X*

11

RESPONSIBILITY: SEWAGE COLLECTION: (CONTINUED)

❖ The Sewage Collection Division's responsibilities may, under this plan, also include assisting pump station personnel in sand bagging pump stations with impending flooding conditions, cleaning, and disinfecting areas where sanitary sewer overflows may have occurred.

a) Total personnel requirements from the Sewer Collection Division during OPP will be:

- 24 crew members
- 2 supervisors (6 crews and 1 supervisor per shift).

(Appendix B).

OBJECTIVE XIII
PERFORMANCE OF MAINTENANCE TO SCADA EQUIPMENT

RESPONSIBILITY: INSTRUMENT TELEMETRY UNIT

❖ Two (2) Instrument Technicians are to be assigned for two Service Areas.

❖ The Instrument Technicians are to be stationed at pump stations requiring continuous monitoring (See **Objective VIII**), but will respond to service requests at any pump stations located in the assigned Service Area (Appendix B-B1).

Objective XIV
ESTABLISH CREWS FOR POSTING SEWER OVERFLOW SIGNAGE

Responsibility: Customer Service Personnel

❖ Customer Service crews are tasked with posting of overflow signage as needed. These efforts are to be coordinated by the designated Assistant Superintendent at the Command Center.

OBJECTIVE XV
IDENTIFY AND COMPLY WITH ALL DOCUMENT CONTROL NEEDS

Responsibility: Administration Support Section

❖ The Data Management Unit (DMU) is responsible for setting up the Command Center to include the computer, projector, and other materials.

❖ The DMU is to print out pump station operation trend graphs from the SCADA system as requested during each shift.

ADMINISTRATION SUPPORT SECTION: (CONTINUED)

❖ The DMU will request that MIS Division create an Archive Folder for the event, to store the electronic scanned copies of the station alarms generated by the Communication Center.

❖ Clerical staff is to be directed to provide support for the tracking of trouble call R.O. numbers, spill reports, and maintain a log of events and actions as needed for proper and accurate documentation as necessary during each shift (Personnel requirements: See Appendix B2).

❖ The Administration Section is to request 24-hour Stores support at the Westwood Lakes Facility.

APPENDIX A

Pump Station Maintenance Service Area Map

This information was removed for reasons related to Departmental Security

APPENDIX B
OVERFLOW PREVENTION PLAN
CREW/PERSONNEL REQUIREMENTS

	SHIFT 1 8:00 AM - 9:00 PM	SHIFT 2 9:00 PM - 8:00 AM
O.P.P. Command Center	Division Chief 2 Assistant Superintendents Administration Section Supervisor	2 Assistant Superintendents
Electrical Monitoring & Response Crews Minimum Requirements	24 Plant Electricians	24 Plant Electricians
Inspect 2 Routes - Electrical Crews	16 Plant Electrician	16 Plant Electricians
Plant Electrical Supervisors	2 Plant Electrical Supervisors	3 Plant Electrical Supervisors
Mechanical Monitoring & Response Crews Minimum Requirement	23 Mechanical Personnel	23 Mechanical Personnel
Inspect 4 Routes- Mechanical Crews	32 Mechanical Personnel	32 Mechanical Personnel
Plant Mechanical Supervisors	4 Plant Mechanical Supervisors	4 Plant Mechanical Supervisors
Structural Maintenance Response & Emergency Pumping Crews	15 Structural Maint. Workers	15 Structural Maint. Workers
Structural Maintenance Supervisors	2 Structural Maint. Superv. 1 Assistant Supervisor Structural	2 Structural Maint. Supervisors
Diesel Mechanics Response	4 Diesel Mechanics	4 Diesel Mechanic
Instrument Technicians Response	4 Instrument Technicians	4 Instrument Technicians
Administration Section	2	2

Shift 1 Total Personnel Minimum Requirements: **133**

Shift 2 Total Personnel Minimum Requirements: **131**

APPENDIX B 1

OVERFLOW PREVENTION PLAN

STATIONS REQUIRING CONTINUOUS MONITORING BY FIELD CREWS

SERVICE AREA	PUMP STATION	PERSONNEL REQUIREMENTS
North		
8:00 AM - 9:00 PM	D, F, G	4 Plant Electrician 3 Plant Mechanic 2 Instrument Tech.
8:00 PM - 9:00 AM	D, F, G	4 Plant Electrician 3 Plant Mechanic 2 Instrument Tech.
Central East		
8:00 AM - 9:00 PM	A	2 Plant Electrician 1 Plant Mechanic
8:00 PM - 9:00 AM	A	2 Plant Electrician 1 Plant Mechanic
Central West		
8:00 AM - 9:00 PM	B, C	4 Plant Electrician 2 Plant Mechanic 2 Instrument Tech.
8:00 PM - 9:00 AM	B, C	4 Plant Electrician 2 Plant Mechanic 2 Instrument Tech.
South		
8:00 AM - 9:00 PM	J, K	2 Plant Electrician 2 Plant Mechanic
8:00 PM - 9:00 AM	J, K	2 Plant Electrician 2 Plant Mechanic

Plant Electrician:	24
Plant Mechanic:	16
Instrument Technician:	8

APPENDIX B 2

OVERFLOW PREVENTIONPLAN

ADMINISTRATIVE SUPPORT SECTION

STAFF SCHEDULE

TIME	PERSONNEL
8:00 AM - 9:00 PM	Data Entry Specialist 1 Account Clerk
8:00 PM - 9: 00 AM	Account Clerk Information Technology Specialist

Back-Up Coverage: Administrative Officer 3
(As Needed)   Account Clerk

Appendix C

ROUTINE MAINTENANCE ROUTES
NORTH SERVICE AREA

ELECTRICAL SUPERVISOR
ELECTRICAL MAINTENANCE UNIT

STRUCTURAL SUPERVISOR
STRUCTURAL MAINTENANCE UNIT

MECHANICAL SUPERVISOR MECHANICAL MAINTENANCE UNIT #1			MECHANICAL SUPERVISOR MECHANICAL MAINTENANCE UNIT #2		
Route #1	Route #2	Route #3	Route #4	Route #5	Route #6
This information was removed for reasons related to Departmental Security					

Appendix C1

ROUTINE MAINTENANCE ROUTES
CENTRAL EAST SERVICE AREA

ELECTRICAL SUPERVISOR
ELECTRICAL MAINTENANCE UNIT

STRUCTURAL SUPERVISOR
STRUCTURAL MAINTENANCE UNIT

MECHANICAL SUPERVISOR			MECHANICAL SUPERVISOR		
MECHANICAL MAINTENANCE UNIT #1			MECHANICAL MAINTENANCE UNIT #2		
Route #1	Route #2	Route #3	Route #4	Route #5	Route #6

This information was removed for reasons related to Departmental Security

Appendix C2

ROUTINE MAINTENANCE ROUTES
SOUTH SERVICE AREA

ELECTRICAL SUPERVISOR
ELECTRICAL MAINTENANCE UNIT

STRUCTURAL SUPERVISOR
STRUCTURAL MAINTENANCE UNIT

MECHANICAL SUPERVISOR			MECHANICAL SUPERVISOR		
MECHANICAL MAINTENANCE UNIT #1			MECHANICAL MAINTENANCE UNIT #2		
Route #1	Route #2	Route #3	Route #4	Route #5	Route #6

This information was removed for reasons related to Departmental Security

Appendix C3

ROUTINE MAINTENANCE ROUTES
CENTRAL WEST SERVICE AREA

ELECTRICAL SUPERVISOR
ELECTRICAL MAINTENANCE UNIT

STRUCTURAL SUPERVISOR
STRUCTURAL MAINTENANCE UNIT

MECHANICAL SUPERVISOR			MECHANICAL SUPERVISOR		
MECHANICAL MAINTENANCE UNIT #1			MECHANICAL MAINTENANCE UNIT #2		
Route #1	Route #2	Route #3	Route #4	Route #5	Route #6
This information was removed for reasons related to Departmental Security					

APPENDIX D
MANHOLES TO BE MONITORED DURING O.P.P

Page# _____

Date _____

This information was removed for reasons related to Departmental Security

Address	Manholes	Routes	Time	Status	Time	Status	Time	Status	Time	Status
		1								
		2								
		2								
		2								
		2								
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APPENDIX "E" PORTABLE EMERGENCY EQUIPMENT

Portable Pump Inventory

North		**Opa-Locka Maintenance Facility**
23-2667	4"	Gas Portable Pump
23-3758	6"	Gas Portable Pump
23-4416	6"	Gas Portable Pump
23-4417	6"	Gas Portable Pump
23-4781	8"	Diesel Portable Pump
23-4799	10"	Diesel Portable Pump
23-4776	6"	Diesel Portable Pump
23-4768	6"	Diesel Portable Pump
23-4777	6"	Diesel Portable Pump
23-4805	6"	Diesel Portable Pump
23-4801	4"	Diesel Portable Pump

Central East		**36th Street Maintenance Facility**
23-4258	4"	Gas Portable Pump
23-4259	4"	Gas Portable Pump
23-4454	6"	Electrical Portable Pump
23-4471	4"	Gas Portable Pump
23-4764	6"	Diesel Portable Pump
23-4766	6"	Diesel Portable Pump
23-4774	6"	Diesel Portable Pump

Central West		**Westwood Lakes Maintenance Facility**
23-3783	6"	Diesel Portable Pump
23-4145	8"	Diesel Portable Pump
23-4256	6"	Electrical Portable Pump
23-4367	6"	Silent Portable Pump
23-4368	6"	Silent Portable Pump
23-4765	6"	Silent Portable Pump
23-4775	6"	Silent Portable Pump
23-4802	4"	Gas Portable Pump
23-4806	6"	Silent Portable Pump

Portable Pump Inventory: (Continued)

South		**South Miami Heights Maintenance Facility**
23-4254	6"	Gas Portable Pump
23-4255	6"	Gas Portable Pump
23-4446	6"	Diesel Portable Pump
23-4453	6"	Diesel Portable Pump
23-4497	4"	Electrical Portable Pump
23-4498	6"	Electrical Portable Pump
23-4767	6"	Diesel Portable Pump
23-4779	6"	Diesel Portable Pump
23-4780	6"	Diesel Portable Pump
23-4798	8"	Diesel Portable Pump
23-4800	4"	Diesel Portable Pump
23-4807	6"	Diesel Portable Pump

(Total 39 Units)

APPENDIX "E" PORTABLE EMERGENCY EQUIPMENT

Portable Generator Inventory

North		Opa-Locka Maintenance Facility
24-1321	Generator	150 KW
24-1323	Generator	100KW
24-1329	Generator	100KW
24-1279	Generator	75 KW
24-1336	Generator	60 KW
24-1337	Generator	60 KW
24-1343	Generator	60 KW
24-1347	Generator	60 KW
24-1348	Generator	60 KW
24-1349	Generator	60 KW

Central East		36th Street Maintenance Facility
24-1324	Generator	100 KW
24-1328	Generator	100 KW
24-1502	Generator	130 KW
24-1274	Generator	75 KW
24-1339	Generator	60 KW
24-1340	Generator	60 KW

Central West		Westwood Lakes Maintenance Facility
12-0951	Generator	300 KW
24-0445	Generator	125 KW
24-0677	Generator	60 KW
24-1273	Generator	75 KW
24-1XXX	Generator	75 KW
24-1320	Generator	150 KW
24-1330	Generator	100 KW
24-1331	Generator	100 KW
24-1334	Generator	60 KW
24-1346	Generator	60 KW
24-1350	Generator	60 KW
24-1351	Generator	60 KW
24-1373	Generator	75 KW

Portable Generator Inventory: (Continued)

South	South Miami Heights Maintenance Facility	
24-1326	Generator	100 KW
24-1327	Generator	100 KW
24-1332	Generator	100 KW
24-1325	Generator	100 KW
24-1271	Generator	75 KW
24-1272	Generator	75 KW
24-1275	Generator	75 KW
24-1333	Generator	60 KW
24-1341	Generator	60 KW
24-1342	Generator	60 KW
24-1344	Generator	60 KW
24-1345	Generator	60 KW
24-1338	Generator	60 KW
24-1335	Generator	60 KW
24-1352	Generator	60 KW

(Total 44 Units)

APPENDIX F
PUMP STATION MAINTENANCE DIVISION
SUPERVISORY ROSTER

NAME	TITLE	ADMINISTRATION SECTION	OFFICE #	FAX #	PAGER #	RADIO LID #	CELLULAR #
ADMINISTRATION SECTION							
	Chief	WWL/ Chief's Office					
	AO3	WWL/ Admin. Section					

NAME	TITLE	COUNTYWIDE	OFFICE #	FAX #	PAGER #	RADIO LID #	CELLULAR #
MECHANICAL MAINTENANCE SECTION							
	Assistant Superintendent	WWL/ Mech. Section Chief					
	Plant Maint. Supervisor	Interama/Mechanical Unit 1					
	Plant Maint. Supervisor	Interama/Mechanical Unit 2					
	Plant Maint. Supervisor	36th St./Mechanical Unit 1					
	Plant Maint. Supervisor	36th St./Mechanical Unit 2					
	Plant Maint. Supervisor	SMH/Mechanical Unit 1					
	Plant Maint. Supervisor	SMH/Mechanical Unit 2					
	Plant Maint. Supervisor	WWL/Mechanical Unit 1					
	Plant Maint. Supervisor	WWL/Mechanical Unit 2 / Submersible Repair Unit					

NAME	TITLE	COUNTYWIDE	OFFICE #	FAX #	PAGER #	RADIO LID #	CELLULAR #
ELECTRICAL MAINTENANCE SECTION							
	Assistant Superintendent	WWL/ Electrical Section Chief					
	Plant Elec. Supervisor	36th St./ CE Electrical Unit					
	Plant Elec. Supervisor	WWL/ CW Electrical Unit					
	Plant Elec. Supervisor	Interama/ North Electrical Unit					
	Plant Elec. Supervisor	SMH/ South Electrical Unit					
	Plant Elec. Supervisor	Medley/ Capital Project Unit					

NAME	TITLE	COUNTYWIDE	OFFICE #	FAX #	PAGER #	RADIO LID #	CELLULAR #
STRUCTURAL MAINTENANCE SECTION							
	Assistant Superintendent	WWL/ Struct. Section Chief					
	Struct. Maint. Supervisor	36th St./ CE Structural Unit					
	Struct. Maint. Supervisor	SMH/ South Structural Unit					
	Struct. Maint. Supervisor	Interama/ North Structural Unit					
	Struct. Maint. Supervisor	WWL/ Manhole-Wetwell-Struct. Improv. Crew					
	Struct. Maint. Supervisor	WWL/ CW Structural Unit					
	Engineer 2 (Part-time)	WWL/Administrative Section					

Locations:	36th St.:
	Interama:
	WWL:
	SMH:
	Medley:
	WASD 24 Hr. Emergency

Revised June 06

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APPENDIX G
OVERLFOW PREVENTON PLAN
NOTIFICATION LIST

This information was removed for reasons related to Departmental Security

Appendix 2 Hurricane Francis Debriefing (PowerPoint Presentation)

Hurricane Katrina Debriefing

Miami-Dade Water and Sewer Department

Pump Station Maintenance Division

September 8, 2005

Slide 1
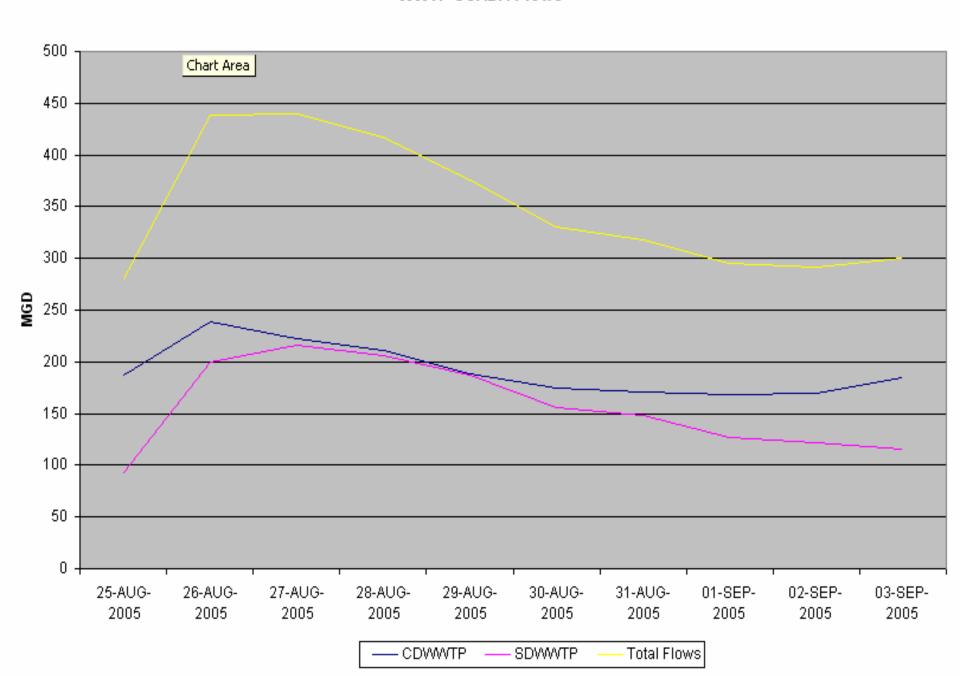
Review Topics

➢ **Statistics**

➢ **SCADA**

➢ **Overflow Prevention Plan (OPP)**

➢ **WASD Hurricane Plan**

➢ **Communications**

➢ **Command Center Operations**

➢ **Equipment**
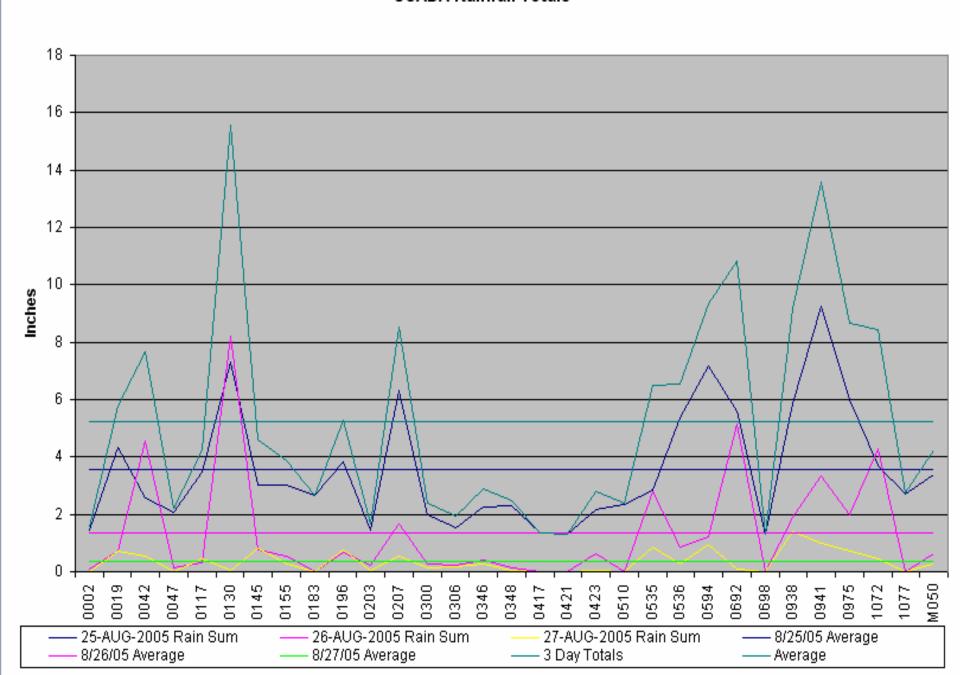
Statistics

- Department maintains over 992 Pump Stations
- Power failures
  - 740 8/25/2005
  - 863 Total
- 741 SCADA Communication failures
- 1 PS related documented overflow - #0807
- 1 Sewer Backup - #0561
- 81 Station Flooding Alarms
  - 23 Actual flooded drywells that required equipment repairs

WWTP SCADA Flows

A line chart titled "WWTP SCADA Flows" with the y-axis labeled "MGD" ranging from 0 to 500, and the x-axis showing dates from 25-AUG-2005 to 03-SEP-2005. A "Chart Area" label appears in the upper left. Three data series are plotted: CDWWTP (dark blue), SDWWTP (magenta), and Total Flows (yellow).

SCADA Rainfall Totals

OPP

➢ **Restricted implementation**

- **Shortage of personnel per shift to simultaneously perform**
  - **OPP**
  - **Storm damage assessment**
- **Shift change – Support personnel received were on different schedules**

Hurricane Plan

- **Department priorities not clearly established**
  - **Department Hurricane Plan not synchronized to handle priorities**
  - **Shortage of personnel per shift to simultaneously perform**
    - o **OPP**
    - o **Storm Damage assessment**
- **Lack of emergency generator deployment plan**
  - **Delay in deployment**
  - **Refueling issues**
- **Inability to contact service contractors; i.e. Siemens, Eaton, Pantropic**

SCADA

- Sewer Flow meters not working
- Retrieving information time consuming due to alarm summaries do not providing totals
  - Per summary
  - Per signal
  - Per zone
- Operations jeopardized due to display screens with questionable data and false indications due to extended loss of power
- Command Center SCADA computers
  - Constantly encountering <u>Vax</u> <u>Link</u> <u>Failures</u>
  - Automatically disconnecting

Communications

➢ **Radio communication increased traffic**

- **1 channel per service area**
- **Cell phones (Nextel) poor service**
- **Cable Service went down**
- **Current Command Center poor reception for radios & cell phones**
- **Emergency contact for other agencies & utilities not accessible (password)**

Command Center Operation

- ➢ **Personnel shortage**
  - ▪ **SCADA operation**
  - ▪ **Diesel fuel delivery coordination**
    - o Equipment running out-of-fuel
    - o Non-operating equipment refueled
    - o Lack of information available for generator refueling (burn rates)
  - ▪ **Generator deployment coordination**
- ➢ **Lack of space – "Outgrown" current space**

Equipment

- ➤ **All mounted generators**
    - ▪ **Require SCADA indication**
        - o **Provided false indication of power failure/restoration**
    - ▪ **Require permanent connection**
- • **Large capacity generator shortage**
    - ▪ **PSMD only has 1 generator >=300 KW**
- • **Vehicle issues after storm**

Current Status

➢ **Complete repairs of equipment damaged by water due to flooding**

➢ **FEMA Documentation**

  ▪ **Shortage of clerical personnel to process documentation (DARS)**

To Do "Priorities"

- Synchronize Hurricane response/recovery procedures department-wide
- Identify roles & responsibilities "1 conductor to lead the Orchestra"
  - All Pump Station activities need to be coordinated from WWL Command Center
- Complete new Command Center renovations
- Fill FTE vacancies
- Complete upgrade of SCADA to new Windows Based "Open Enterprise"
- Resolve RTU software issue for extended loss of electrical power
- Investigate all communication options

To Do "Priorities"

- ➢ **Generators**
  - ▪ **Connect SCADA to all mounted generators**
    - o **Run indication**
    - o **Fuel levels**
  - ▪ **Collect and centralize generator information**
- • **Investigate monitoring AC power from line side of breakers**